# THE IRON TRADE REVIEW

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## SOUND CONDITIONS

### IN SPITE OF SUMMER DULLNESS AND SOME SAGGING IN PRICES.

**Heavy Orders on Books—New Record for Ore Shipments is Made.**

While those who are of pessimistic disposition may point to certain events and tendencies as indicating that the iron and steel trade is about to enter upon a period of profound depression, there is really no foundation for gloomy foreboding. On the contrary, there is abundant evidence not only in general business, but in the iron and steel trade itself, that while summer dullness has set in rather early, conditions are sound. It is true that lower prices may prevail in pig iron and some other products, but this will not cause any serious derangement of business.

**Favorable Features.**

The American Car & Foundry Co. has announced the receipt of a large order for cars for the Japanese government to be rushed, and a Philadelphia coal company has closed a contract with the same company for a large number of steel cars. The Middletown, Pa., car works have taken an order for 500 cars as a rush order for Japanese railways.

**Southern Iron is Weaker.**

In pig iron, Southern furnaces are showing increased eagerness for business, and prices have declined to a basis of $12 Birmingham for No. 2, a decline of $1 in two weeks, but concessions have resulted in little business. While Northern iron has in some cases been sold at somewhat lower prices, many furnaces are well sold up, some having disposed of their output up to October 1, and they will not contract at lower prices than those recently quoted. On the whole, the Northern situation in foundry iron is much stronger than that of the South. Inquiries in the East, especially in New York, have been more numerous, but seldom result in orders. Foundries, as a rule, are busy and orders to delay shipments of pig iron are very rarely heard of. In some cases deliveries are anticipated.

**Curtailment is Slight**

Iron and steel producing capacity of some of the leading interests has been curtailed to a limited extent, owing to decreased demand for finished products, and other mills may be idle soon, but steel plants and blast furnaces which furnish material for mills making heavier lines will continue in full operation all summer. The decrease in production of sheets, tin plate and wire products is not as marked as usual at this time of the year.

**Evidence of Prosperity.**

Many facts showing that prosperity is not vanishing might be cited. Not only is the shipbuilding industry enjoying unprecedented prosperity, but railroads have bought heavily of rails and cars, steel car works never having booked so many orders as at present; bridge construction is large and the demand for steel for new buildings is extremely heavy. Among large orders of the week were 10,000 tons of structural material for bridge work for the Long Island Railroad and 7,000 tons for a large Wisconsin concern's new buildings.

**An Effect of the Strike.**

The teamsters' strike in Chicago has resulted in a congestion of iron and steel stocks in that great jobbing center. Shipments of some of the finished lines have been held up by jobbers, who have no means of getting the material to their warehouses and who in turn are unable to meet the demands of their consumers. If the strike continues much longer it is probable that the jobbers will give the mills instructions to make shipments to their consumers direct, as the only solution to the problem, which is done now to only a limited extent.

**New Ore Record.**

A new record for ore shipments from Lake Superior docks was made in May, the total shipments being 4,619,431 tons, more than 500,000 tons in excess of any previous month's record. At this rate, there will be no difficulty in handling 30,000,000 during the season.

## DOVER FURNACE

**Sold to M. A. Hanna & Co.—Will Make "Mable" and Other Brands.**

S. W. Croxton and Associates, owners of the stock of the Penn Iron & Coal Co., owning and operating the Dover furnace at Canal Dover, O., have sold the controlling interest to M. A. Hanna & Co., of Cleveland. The officers of the company have been: S. W. Croxton, president and general manager; C. H. Davis, vice president; H. S. Ream, secretary; J. P. Burton, treasurer; James E. Moyer, superintendent. All of the present stockholders will retain an interest, and Mr. Croxton and Mr. Burton will be directors. Mr. Croxton has been connected with the Dover furnace 40 years. It has one stack, 85 x 20, built in 1854 and blown in in 1855; rebuilt in 1878-9 and remodeled and-enlarged in 1895; and again rebuilt in 1903. The furnace is now modern in all respects. It has three Cowper-Roberts fire-brick stoves, each 70 x 18, and one Foote stove, 75 x 19 ft. Its product is foundry, basic, malleable and Bessemer pig iron, and its annual capacity 146,000 tons. It is equipped with one Davies pig iron casting machine. The furnace was placed in blast this week. Under the new ownership the stack will make Bessemer, basic, malleable, the "Mable" brands of malleable and foundry formerly made at Mable furnace and the "Tuscarawas" brand of foundry iron, which has long been made by the Dover furnace. The name of the old company will probably be retained, but this has not been decided, nor have new officers been elected.

# THE WEEK IN IRON CENTERS.

## PITTSBURG.

### Iron and Steel Trade not on the Verge of Serious Depression.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, June 6.

The iron and steel producing capacity of a few of the leading interests has been curtailed in the past week owing to the falling off in the demand for some of the more highly finished products. There will be a further curtailment in production this month, but it will be only slight, as the steel plants and blast furnaces serving the mills producing the heavier lines will continue in full throughout the summer months, all of these mills having not only orders but specifications ahead of them for three to four months' operations. Too much significance has been placed on the curtailed demand for sheets, tin plate and wire products as affecting the entire iron and steel trade. The production in the former two lines this year has been abnormal, and it is only following a well established precedent to slow up for the summer months. Both lines have their periods of activity and their seasonable demand, and in the face of heavy buying earlier in the year the operation of the mills as full as they are at present is surprising to the manufacturers themselves. The wire mills are now in their off season for wire products, the jobbers having bought months ago and are now drawing on their stocks to meet the demands of consumers. It is true that there was speculative buying in all these lines, despite the vigilance of the leading manufacturers to prevent it wherever possible, and some large jobbers carrying a bigger tonnage than they should have at this season of the year are making concessions below mill prices to dispose of their surplus, which they can do at a profit, having bought at prices considerably lower than those ruling today.

It is significant that the steel producing capacity curtailed thus far is entirely Bessemer, this grade of steel entering largely into the production of these finished lines. The furnaces blown out also serve these plants with the exception of the 'overflow' stacks of the steel corporation such as the furnaces at Niles, Zanesville and Columbus, O. Two furnaces at Bellaire, operated by the Carnegie Steel Co., went out this week, and the Bessemer plant at that place as well as the one at Columbus, O., will go out. The two furnaces and the Bessemer plant of the National Tube Co. at Wheeling are also idle for extensive repairs, but their output can be spared at this time, as the demand for pipe, while better than at any time in the past two months, is still below normal. About 35 percent of the Bessemer producing capacity of the steel corporation is now idle or will be idle in the next few days, but the open-hearth production remains unchanged, this steel entering into the production of the heavier lines, the demand for which is almost unprecedented.

An analysis of the situation will show that the iron and steel trade is by no means on the verge of a period of serious depression. The railroads have bought heavily of rails and cars. The rail mill of the Illinois Steel Co. is booked through the remainder of the year, while the Edgar Thomson mill of the Carnegie Steel Co. now has four months' specifications on its books. Never before have the steel car works carried as many orders on their books as at present, insuring work for the plate and light shape mills almost to the end of the year. The ship building trade on the lakes and the coast is good, and the outlook, especially on the lakes for next year, is exceedingly bright. This means an additional heavy tonnage for the plate and shape mills. The large orders for cars placed by the railroads has filled up the steel casting and malleable foundries, and while the grey iron foundries have not felt the general prosperity of the steel trade, a big improvement is reported throughout this district. As to bars the situation is not so well defined, the agricultural implement manufacturers being the largest consumers and the crops will almost entirely govern future buying. Early reports are encouraging, and these large consumers will definitely place contracts for their future requirements in July or early in August. This has been an off season for merchant pipe, but the belated demand has now set in. The demand for line pipe is far below that of last year, which was a record breaker, but boiler tubing is crowding the mills to the limit of their capacity. While not knowing what the cotton crop will be this year, orders for cotton ties aggregating 750,000 bundles have already been placed with the mills, half of last year's consumption, which broke all previous records on account of the great cotton production. Bridge construction by the railroads, while not unprecedented, is large, while the amount of steel required for building purposes this year will break all previous records. The orders on the books of the large companies is unprecedented, and even if there should be a cancellation of a part of this tonnage, it would no doubt be welcomed by some of the mills that are overcrowded with work at present.

This week the Republic Iron & Steel Co. received orders for 20,000 tons of rails for delivery the last half of the year, and the rail mill at Youngstown will begin operations in July. The rails were closed at the agreed price of $28, despite the fact that this company is not a party to the rail agreement. The reports of the dissolution of other associations and price agreements are without foundation. Prices are unchanged and there is no indication of a break in the immediate future. Despite prevailing reports, no meeting of the steel manufacturers was called for this week in New York, and while lower premiums on billets and sheet bars are asked, none of the mills are yet down to the official prices.

**Pig Iron.**—The decision of the steel corporation not to buy Bessemer from the merchant furnaces for June has resulted in slightly lower prices being named and $15.00, furnace, is now being done on small lots for prompt delivery. It is probable that this could be shaded 25 cents on a large tonnage. There is practically no demand for foundry iron and while the furnaces generally are asking $15.50 this can be shaded from 10 to 15 cents a ton. During the week four additional furnaces of the steel corporation have gone out while the merchant stacks are operating as they have been for the past ten days. The prospects are not bright for a corporation purchase of Bessemer during July, and rather than pile their iron further, it is probable that some of the valley stacks will blow out. One thousand tons of Virginia basic have been sold at $13.75, furnace, for western shipment. This is a concession of 25 cents compared with last previous rates. We revise quotations as follows:

| | |
|---|---|
| Bessemer, Valley | $15 00 |
| Bessemer, Pittsburg | 15 85 |
| No. 1 Foundry | 16 75 to 17 00 |
| No. 2 Foundry | 16 25 to 16 35 |
| Gray Forge, Pittsburg | 15 25 to 15 40 |
| Basic, Valley | 15 00 |
| Basic, Pittsburg | 15 85 |

**Steel.**—Lower prices are now being named on both billets and sheet bars, but none of the mills have yet come down to the official quotations. Bessemer billets are quoted at $22 to $22.50 and sheet bars at $23.50 to $24. Open-hearth billets are quoted at $23 to $23.50 and sheet bars at $24 to $24.50. Bessemer and open-hearth rods are easier and are held at $33 to $34.

**Ferro-Manganese.**—The market is easy, and we quote foreign ferro, 80 percent at $49 to $51, in carload lots, f. o. b. mill, this district.

**Muck Bar.**—Neutral bars are quoted at $26.50, Valley mill. There is little demand.

**Skelp.**—All of the skelp mills are operating on orders placed some time ago and little new business is being placed. We quote grooved steel at 1.50c and sheared 1.55c to 1.60c. Grooved iron is held at 1.65c and sheared at 1.70c to 1.75c.

**Rails and Track Material.**—The Republic Iron & Steel Co. this week closed two orders for rails for delivery this year aggregating 20,000 tons. This marks the entrance of this company into the rail business, and while it is not a party to the rail agreement it is adhering to these prices. The mill will be placed in operation early in July. Demand for light rails continues fair, but prices are low and most of the rerolling mills continue idle, being unable to compete. We quote:

Fifty lb. and over 500 tons, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 lb., $25 to $25.50; 20 lb., $24 to $24.50; 25 to 45 lb., $22 to $22.50; angle bars for standard sections, 1.25c; spikes, 1.70c.

**Plates.**—Demand for open-hearth plates continues heavy and the specifications from the steel car works are heavier than ever before. The demand for Bessemer plates has improved slightly, but the boiler and tank trades have not yet shared in the general prosperity of the steel trade. We make the following quotations: Tank plates, 1¼ in. thick 6¼ in. to 14 in., inclusive, 1.50c f. o. b. mill Pittsburg; over 14 in. up to 100 in., 1.60c. Extras are as follows per lb.: Flange and boiler steel, 10c; marine, A. B. M. A., and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 in. up to 110 in. width, not less than 5c per lb. extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, $2 extra; gauges 7 and 8, $3 extra; No. 9, $5 extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except the Pacific Coast.

**Bars.**—Specifications continue heavy for both iron and steel bars, and while the large consuming interests have not yet closed for future requirements, the early crop reports are so favorable that a good buying movement is anticipated in July and August. Demand for iron bars from steel car works and railroads is heavy and none of the local mills will quote below 1.60c, despite the low prices that are prevailing in other localities. We revise quotations as follows: Bar iron, 1.60c, Pittsburg; hoops 1.65c, and bands, 1.50c, both taking hoops and band extras respectively. Bessemer steel bars, 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees, under 3 in., 1.65c. The following differentials are maintained on steel: Less than 200 lb. of a size and not less than 1,000 lb., 10 cents advanced; less than 1,000 lb. of a size, 30 cents advanced.

**Structural Material.**—None of the local fitting shops have closed large orders during the week, although considerable business is being figured on. All of the shops have from three to four months' business ahead of them. Quotations are unchanged as follows: Beams and channels up to 15 in., 1.60c; over 15 in., 1.70c; angles, 3 x 2 up to 6 x 6, 1.60c; zees, 1.50c; tees, 1.65c; angles, from 3 to 16 in., 1.60c; universal and sheared plates, 6¼ to 14 in., inclusive, 1.50c; over 14 in., 1.60c base.

**Sheets.**—Few of the sheet mills of the American Sheet & Tin Plate Co. have been shut down up to the present time on account of the falling off in demand and all of the independents are on in full. Many of the mills are preparing for their regular summer shutdown and by July it is estimated that fully 50 percent of the sheet producing capacity of the country will be idle. For 28 gauge 2.30c is now the basis, this price having been established by the large jobbers with surplus stocks on their hands rather than by the mills. The leading producer is, however, strictly adhering to the official price of 2.40c, although no business is being taken on this basis. We revise quotations as follows: No. 30, 2.70c; No. 29, 2.60c; No. 28, 2.30c; No. 27 2.20c; Nos. 25-26, 2.20c; Nos. 23-24, 2.15c; Nos. 18-20, 2.10c; No. 16, 2.10c; Nos. 12-14, 2.05c; No. 9, 2c; No. 8, 1.95c; Galvanized, No. 30, 4.30c; No. 29, 3.80c; No. 28, 3.40c; No. 27 3.20c; Nos. 25-26, 3c; Nos. 23-24, 2.80c; Nos. 18-20, 2.65c; No. 16, 2.50c.

**Tin Plate.**—Demand and specifications for tin plate is now about 50 percent of the producing capacity and in consequence the production will be curtailed. The American Sheet & Tin Plate Co. now has 36 tin mills idle and the Shenango plant at New Castle, containing 30 mills will be shut down in a few days for repairs. Concessions in prices are also being made by large jobbing interests and some outside mills and as low as $3.45 is being done on 100-lb. cokes, f. o. b. mill, Pittsburg.

**Cotton Ties.**—Orders for 750,000 bundles of cotton ties have already been placed with the cotton tie mills which is about half of last year's consumption. Further orders will depend largely on the crop. We quote ties at 85c in 3,000 bundle lots and over.

**Merchant Steel.**—Demand continues fair, but there is no buying for future requirements. We quote: Cold rolled and ground shafting, 50 percent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.70c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.70c to 1.75c; toe calk, 2c to 2.05c.

**Old Material.**—Dealers are now buying low priced material and laying it in stock for a higher market. The mills are not buying at present except at a big sacrifice and dealers generally are not inclined to meet their views. We quote, gross tons, as follows: Heavy smelting stock, $14 to $14.50; cast scrap, $14.75 to $15; sheet scrap, $13.50 to $14; cast borings, $9.50 to $10; No. 1 wrought, $16.75 to $17.

**Coke.**—Coke production continues at about 350,000 tons weekly in the Connellsville region, but this will be slightly curtailed on account of the blowing out of steel corporation stacks. Foundry coke is quoted at $2.35 to $2.40 for the better grades and furnace at $1.80 to $1.90. The market is exceedingly quiet and both furnaces and foundries are not closing for future requirements.

**Pipe and Tubes.**—Demand for merchant pipe continues good, but concessions of about 2 points below listed prices continue to be made. Orders for boiler tubing continue to crowd the mills, but line pipe business continues light. Discounts to consumers, carload lots, f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

| | Steel. | | Iron. | |
|---|---|---|---|---|
| | Black. | Galv. | Black. | Galv. |
| ⅛ and ¼ inch | 67 | 51 | 65 | 49 |
| ⅜ to 6 inches | 75 | 65 | 73½ | 63½ |
| ⅜ and ½ inch | 71 | 59 | 69 | 57 |
| 7 to 12 inches | 70 | 55 | 68½ | 53 |
| Extra Strong Plain Ends. | | | | |
| ⅛ to ⅜ inch | 60 | 48 | 58 | 46 |
| ½ to 4 inches | 67 | 55 | 65 | 53 |
| 4½ to 8 inches | 63 | 51 | 61 | 49 |
| Double extra strong plain ends, ½ to 8 inches | 56 | 45 | 54 | 43 |

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

| | Steel. | Iron. |
|---|---|---|
| 1 to 1¼ inches | 44 | 41 |
| 1 ¼ to 2½ inches | 56 | 41 |
| 2½ inches | 58 | 46 |
| 2¾ to 5 inches | 64 | 53 |
| 6 to 13 inches | 56 | 41 |

Less than carloads 2 points less.

**Wire and Wire Nails.**—Jobbers report a good demand for nails and plain wire, but little new business will reach

the mills until stocks are worked off. A meeting of the cut nail manufacturers was held in Philadelphia last week but not change was made in prices. We make the following quotations: Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85c, and less than carloads $1.95; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30c for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in ten days. Iron and steel cut nails, $1.70 to $1.75.

## CHICAGO.

### Situation Shows Some Irregularity — Dullness in Pig Iron.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, June 6.

Considering the dullness in the Western pig iron market, one of the large sellers says the marvel to him is that prices have not gone off more radically in the past month or two. There must be some sustaining force, he says, that does not appear on the surface. The general situation is somewhat mixed this week. Pig iron is weak. There is for some of the finished products a demand not quite so heavy, but for others it shows no impairment. A slight falling off in the specifications can also be noted in some products, but on the whole the situation is scarcely less satisfactory. New business in structural material just about offsets the output of the mills, so that they are not gaining perceptibly on their orders. But recently the mills were booking more than they could produce. Whatever other forces may be at work to influence the consumption of iron and steel, the building operations are under enough momentum to swing a heavy tonnage for the season, provided there are no unexpected obstructions in the nature of strikes. There is an inquiry for extensions at the Allis-Chalmers Milwaukee plant, which it is estimated will require from 10,000 to 14,000 tons of structural shapes. In moderate lots there is a fair amount of business in sight elsewhere. The activity in construction work carries with it an excellent trade in pipe, nails and various other specialties. There are good prospects ahead for the consumption of shop material, but the buying for the last half of the year has not become active. Pig iron has declined 50 cents or more this week. Purchases of Southern iron have been made under $12.25 Birmingham for No. 2 and a good sized lot would bring out a $12 quotation.

**Pig Iron.**—The weakness in pig iron is said to have originated with some of the Southern furnaces that have at hand a tonnage of iron which they are anxious to move. In some instances the same iron might have been sold at $13.50 two months ago, the holders then regarding the situation as strong at that figure. Now they are willing to consider offers and it is intimated that $12 Birmingham would not be unsatisfactory, sales having been made close to that price. The weakness applies only to spot iron. The furnacemen are unwilling to accept contracts at prices as low as they will sell iron in possession. Northern irons are also weak in tone. For general quotations purposes, $17 probably represents the market, but there is no doubt that an attractive inquiry would bring out a lower quotation. Good sized inquiries spring up occasionally, but they usually disappear before they become orders and current trading is confined to a few small lots. One sale of 1,500 tons is reported, but there have been few transactions above one or two hundred tons each. The old contracts of the foundrymen for the first half of the year will soon expire and thus force a larger buying movement. Because of the large requirements in the near future the market is regarded as uncertain, one contingency being a liability to react at any time. Sellers, however, express confidence in the situation and are delaying purchases. We quote Chicago prices as follows:

| | |
|---|---|
| Lake Superior charcoal | $17 50 to 18 00 |
| Northern Foundry No. 1 | 17 50 to 17 75 |
| Northern Foundry No. 2 | 17 00 to 17 25 |
| Northern Foundry No. 3 | 16 50 to 16 75 |
| Northern Scotch Foundry | 17 50 to 17 75 |
| Ohio Strong Softeners No. 1 | 19 30 to 19 80 |
| Ohio Strong Softeners No. 2 | 18 30 to 18 80 |
| Southern Foundry No. 1 | 16 50 to 17 00 |
| Southern Foundry No. 2 | 15 85 to 16 35 |
| Southern Foundry No. 3 | 15 35 to 15 85 |
| Southern Foundry No. 4 | 15 15 to 15 65 |
| Southern No. 1 Soft | 16 50 to 17 00 |
| Southern No. 2 Soft | 15 85 to 16 35 |
| Southern Gray Forge | 15 40 to 15 90 |
| Southern Mottled | 15 40 to 15 90 |
| Southern Silveries (4% to 6% Silicon) | 17 40 to 18 00 |
| Jackson Co. Silveries (6% to 8% Silicon) | 20 30 to 21 30 |
| Jackson Co. Silveries (8% to 10% Silicon) | 21 30 to 22 30 |
| Alabama and Georgia Car Wheel | 20 65 |
| Malleable Bessemer | 17 00 to 17 50 |
| Basic Iron | 16 40 to 16 65 |

**Billets.**—Premiums continue the rule for the billets that are sold here. Large producers are completely out of the market and local product is in good demand. We quote open-hearth forging billets, $31 to $32 Chicago; Bessemer rerolling, $28; sheet bars, $29.50; Bessemer wire rods, $34 Pittsburg; chain rods, $35 Pittsburg.

**Bars.**—The bar trade is somewhat uncertain. There is irregularity in the quotations for iron bars, with some good prospective business from the car builders. Consumers are usually ordering only for their immediate wants and for the current trading in small lots iron bars bring from 1.50 to 1.55c. There is some talk that steel bars are under pressure, but prices are nevertheless reported firm at 1.66½c, Chicago. The large consumers are not yet purchasing for their future needs, but active negotiations will be due in July. We quote carload lots, mill shipments, Chicago delivery, as follows: Bessemer and open-hearth bars and bands, 1.66½c base, half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 1.81½c base, full extras. Store trade is active and prices are firm. We quote bar iron, 1.90c base, full extras; soft steel bars and bands, 1.85c to 1.95c base, full extras; soft steel angles, channels and tees, under 3 in., 1.95c to 2.05c; hoops, 2.20c base, full extras.

**Sheets.**—The bulk of the sheet trade seems to lie with the jobbers, who bought on long time contracts before the advance in prices. There is quite a comfortable movement from store and to meet those requirements shipments from mills are normally large. It is stated that the sentiment among the independents is better, prices having a tendency to strengthen. We quote carload lots, mill shipments, Chicago delivery, as follows: Blue annealed sheets, Nos. 9 and 10, 1.76½c to 1.81½c; Nos. 11 and 12, 1.81½c to 1.86½c; Nos. 13 and 14, 1.86½c to 1.91½c; Nos. 15 and 16, 1.96½c to 2.01½c. On box annealed, one pass cold rolled, we quote Nos. 18 and 20, 2.21½c to 2.26½c; Nos. 22 and 24, 2.26½c to 2.31½c; Nos. 25 and 26, 2.31½c to 2.36½c; No. 27, 2.36½c to 2.41½c; No. 28, 2.46½c to 2.51½c; No. 29, 2.56½c to 2.61½c; No. 30, 2.66½c to 2.71½c. We quote on lots from warehouse stocks as follows: No. 10, 2.10c to 2.15c; No. 12, 2.15c to 2.20c; No. 14, 2.20c to 2.25c; No. 16, 2.30c to 2.35c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.70c to 2.75c; No. 27, 2.75c to 2.85c; No. 28, 2.85c to 2.95c; No. 29, 3c to 3.05c. Galvanized sheets, mill shipments, Chicago delivery, are quoted as follows: Nos. 12 and 14, 2.56½c No. 16, 2.71½c; Nos. 18 and 21, 2.86½c; Nos. 22 and 24, 3.01½c; No. 26, 3.21½c; No. 27, 3.41½c; No. 28, 3.61½c; No. 29, 3.86½c. Jobbers' prices on lots from store have also been revised and are now as follows: Nos. 10 to 14, inclusive, 3.10c; No. 16, 3c; Nos. 18 and 20, 3.10c; Nos. 22 and 24, 3.25c; No. 26, 3.50c; No. 27, 3.70c; No. 28, 3.95c; No. 29, 4.40c; No. 30, 4.85c.

**Structural Steel.**—Current trade consists mainly of that steady run of specifications from mill that is represented by contracts, but a fair amount of new business is appearing. Country orders for small buildings, using an average of perhaps 100 tons each, are aggregating a considerable tonnage, and there is in prospect some business of a larger order. In-

cluded in this is the extension of the Milwaukee plant of the Allis-Chalmers Co., the steel estimates for which are a minimum of 10,000 tons. The Brevoort hotel at Chicago, the contract for which it is expected will soon be let, will take 2,000 tons and there are other inquiries for smaller quantities. Specifications are perhaps not quite so heavy as recently, but the mills are sold ahead and new business is said to equal shipments. Moreover premiums are still being obtained for prompt shipments. We quote mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in., inclusive, 1.76½c; angles, 3 to 6 in., ¼ in. and heavier, 1.76½c; angles larger than 6 in., or one or both legs, 1.86½c; beams larger than 15 in., 1.86½c; zees, 3 in. and over, 1.76½c; tees, 3 in. and over, 1.86½c; with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. We quote prices from store as follows: 2.10c to 2.25c for angles, beams and channels, base sizes, with 2.20c to 2.30c for 18, 20 and 24-in. beams; tees and zees, 2.15c to 2.25c. These prices are for either random lengths or cut to specifications in excess of 5 ft.

**Plates.**—Within recent weeks the new business in plates at western mills also just about equals the production, so that with the previously heavily filled order books, conditions point to an indefinitely extended activity. We quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ in. and heavier, 6⅛ in. to 100 in., 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base, all full extras. Plates, 3-16 in. thick, $2 extras; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Store quotations are as follows: Tank steel, ¼ in. and heavier, up to and including 72 in. wide, 2c; over 72 in. wide up to 100 in., 2.10c; over 100 in. wide, usual mill extras, 3-16 in. up to but not including 72 in. wide, 2.10c; 3-16 in., 72 in. wide, 2.35c; flange steel, 25c extra; heads, 25c extra.

**Merchant Pipe.**—Shipments from mill show gains over recent weeks, and the tone of the market has improved. There is considerable work in sight. The following official figures now more nearly represent the market. They are in carload lots, f. o. b. Chicago, random lengths, as follows:

MERCHANT PIPE.

| | Steel. | | Iron. | |
|---|---|---|---|---|
| | Black. Percent. | Galv. Percent. | Black. Percent. | Galv. Percent. |
| ⅛ to ¼ inches | 65.85 | 49.85 | 63.85 | 47.85 |
| ⅜ to ½ inches | 69.85 | 57.85 | 67.85 | 55.85 |
| ⅝ to 6 inches | 73.85 | 63.85 | 72.35 | 62.35 |
| 7 to 12 inches | 68.85 | 53.85 | 67.35 | 51.85 |

PLUGGED AND REAMED.

| | Steel. | | Iron. | |
|---|---|---|---|---|
| 1 to 4 inches | 71.35 | 61.35 | 69.85 | 59.85 |

EXTRA STRONG PIPE.

| | | | | |
|---|---|---|---|---|
| ⅛ to ⅜ inches | 58.85 | 46.85 | 56.85 | 44.85 |
| ½ to 4 inches | 65.85 | 53.85 | 63.85 | 51.85 |
| 4½ to 8 inches | 61.85 | 49.85 | 59.85 | 47.85 |

DOUBLE EXTRA STRONG PIPE.

| | | | | |
|---|---|---|---|---|
| ¼ to 8 inches | 54.85 | 43.85 | 52.85 | 41.85 |

**Boiler Tubes.**—There is continued good buying by the railroad companies and sales exceed the current output, making deliveries slow. We quote carload lots, mill shipments, Chicago delivery, as follows:

BOILER TUBES.

| | Steel. | Iron. | Seamless. |
|---|---|---|---|
| 1 to 1½ inches | 40.35 | 37.35 | 53.00 |
| 1¾ to 2¼ inches | 54.35 | 39.35 | 40.00 |
| 2½ inches | 56.35 | 44.35 | 43.00 |
| 2¾ to 5 inches | 62.35 | 51.35 | |
| | | | Up to 4½ inches 50.50 |
| 6 to 13 inches | 52.35 | 37.35 | |

Less than carload lots from store, as follows:

| | Steel. | Iron. | Seamless Steel. |
|---|---|---|---|
| 1 to 1½ inches, inclusive | 40 | 35 | 42½ |
| 1¾ to 2¼ inches, inclusive | 50 | 35 | 35 |
| 2½ inches, inclusive | 52½ | 35 | 30 |
| 2¾ to 5 inches, inclusive | 60 | 47½ | 42½ |
| 6 inches and larger | 50 | 35 | |

**Rails and Track Supplies.**—Locally the trading in standard sections this past week has been light, less than the business reported from other districts. The market, however, is not devoid of inquiries. For track supplies there is a steady demand in fairly good volume and the local mills for track fastenings now have their output for the year pretty well engaged. We quote heavy sections in 500-ton lots and over, f. o. b. mill, $28; less than 500 tons to carload lots, $30; less than carload lots, $32. Light rails are as follows: 12-lb. sections, $27; 16-lb., $26; 20 and 25-lb., $25; 30, 35, 40 and 45-lb. sections, $24, all f. o. b. Milwaukee mill. Track supplies, f. o. b. Joliet mill. Angle bars, 1.40c to 1.50c; spikes, first quality, 1.75c to 1.80c; track bolts, 3¼ x ¾, with square nuts, 2.40c to 2.50c per lb., with hexagon nuts, 2.55c to 2.65c.

**Merchant Steel.**—There are in the market inquiries for several good sized lots, which may be closed within the next few days. Meanwhile the time has arrived when consumption is somewhat checked. Notwithstanding that condition there are mills that are sold ahead for several months. Prices are without change and we quote carload lots, mill shipments Chicago delivery, as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c; plow steel, 2.20c and upward, according to quality; toe calk steel, 2.21½c. Cold rolled shafting, 50 percent off in carload lots and 45 percent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and upwards.

**Cast Iron Pipe.**—Negotiations are in progress on several municipal lots and routine trade continues of goodly volume. Prices are firm, carload lots, Chicago delivery, being quoted as follows: 4in., $29; 6 in. and larger, $28; gas pipe, $1 a ton higher.

**Wire Products.**—Mills are now amply able to take care of current demands, but trade is of normal volume for this season of the year. There is some brightening in the inquiry from the southwest. We quote to jobbers on carload lots, Chicago delivery, as follows: Wire nails, $1.95; painted barb wire, $2.10; galvanized barb wire, $2.40; smooth annealed wire, $1.80; smooth galvanized wire, $2.10; polished staples, $2.05; galvanized staples, $2.35. Less than carload lots to jobbers are 5 cents higher than above prices. The retail trade is quoted 5 cents extra over the foregoing on carload lots, and 10 cents extra on less than carload lots. Bale ties are unchanged at 82½ and 5 percent and 85 percent discount f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet and DeKalb, with actual freight allowed not exceeding 30 cents per 100 lb.

**Foundry Coke.**—There is a disposition for makers of coke to insist upon firmer prices on contracts. The easiness of the market is confined to cars on tracks, threatened with or suffering demurrage charges. This spot coke has occasionally been sacrificed as low as $2 ovens for Connellsville foundry, but contracts are negotiable at $2.50 ovens. Virginia and West Virginia brands range from $2.35 to $2.50 at the ovens. Wise County, Va., coke is offered on the same basis (Chicago delivery) as Connellsville cokes .

**Old Material.**—At the arrested movement in prices, the market is fairly steady. There is no decided tendency in fluctuations and the current trading is tempered by individual conditions. The eager consumer who is constrained to buy is at a disadvantage, but the solicitous seller finds a weak market. In the aggregate there is considerable tonnage moving. The railroads are selling moderate lists. The following are approximate prices asked by local dealers:

| | |
|---|---|
| Old steel rails (4 feet and over) | $14 50 to 15 00 |
| Old steel rails (less than 4 feet) | 13 50 to 14 00 |
| Old iron rails | 19 00 to 19 50 |
| Relaying rails, subject to inspection | 22 00 to 22 50 |
| Old wheels | 14 50 to 15 00 |
| Heavy melting steel | 12 00 to 12 50 |
| Mixed country steel | 9 00 to 9 50 |

The following quotations are for net tons:

| | |
|---|---|
| No. 1 R. R. wrought | 14 00 to 14 50 |
| No. 2 R. R. wrought | 13 00 to 13 50 |
| Shafting | 15 00 to 15 50 |
| Dealers' forge, No. 1 | 11 00 to 11 50 |
| Wrought pipe and flues | 9 50 to 10 00 |
| No. 1 cast, 150 lb. and less | 12 50 to 13 00 |
| No. 1 mill | 9 00 to 9 50 |
| No. 1 Busheling | 9 50 to 10 00 |

| | |
|---|---|
| No. 2 Busheling | 8 50 to 9 00 |
| Country sheet | 7 50 to 8 00 |
| No. 1 boilers, cut | 9 00 to 9 50 |
| Boiler punchings | 12 50 to 13 00 |
| Iron car axles | 20 00 to 20 50 |
| Steel car axles | 15 00 to 16 00 |
| Iron axle turnings | 10 00 to 10 50 |
| Cast borings | 7 00 to 7 50 |
| Mixed borings, etc. | 7 00 to 7 50 |
| Machine shop turnings | 9 50 to 10 00 |
| Railroad malleable | 12 50 to 13 00 |
| Agricultural malleable | 11 50 to 12 00 |
| Stove plate and light cast scrap | 9 50 to 10 00 |
| Old iron splice bars | 16 00 to 16 50 |

## CLEVELAND.

### Record for Ore Shipments—Pig Market Dull.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, June 7.

**Iron Ore.**—In spite of heavy rains which curtailed mining operations, the shipments of ore from upper lake ports for May made a new record, the total being 4,619,431 tons, while the largest shipments ever before made were 4,104,211 tons in August, 1903. Last May only 7,243 tons were shipped, as the strike of lake captains was then in progress. The total for April and May this year is 5,814,604 tons. The May shipments were from the following ports:

| | |
|---|---|
| Escanaba | 702,793 |
| Marquette | 493,699 |
| Ashland | 511,061 |
| Superior | 713,265 |
| Duluth | 1,103,685 |
| Two Harbors | 1,094,928 |
| | 4,619,431 |

The movement this month will probably surpass that of May, although there has been some delay in loading at upper lake ports.

**Pig Iron.**—In spite of rumors of low prices and of the prevailing dullness, most of the furnaces are holding for $15.50, Valley, for No. 2, foundry. We know of a number of furnaces whose product has been sold up to Oct. 1, and they find that nearly all foundries are eager for the delivery of the iron for which they have contracted. In some cases, they ask to have deliveries anticipated, while orders to delay shipments are very rare. Inquiries are coming in in fair volume, but very few orders are being placed. The Southern situation is weak, but even at $12 for No. 2, Birmingham, iron from that section will not be an important factor in the Cleveland market. We quote f. o. b. Cleveland as follows:

| | |
|---|---|
| Bessemer | $15 85 |
| No. 1 Foundry | 16 50 to 16 75 |
| No. 2 Foundry | 16 00 to 16 25 |
| No. 3 Foundry | 15 50 to 15 75 |
| No. 2 Southern | 15 85 to 16 00 |
| Gray Forge | 15 00 to 15 25 |
| Gray Forge, Southern | 14 50 to 15 00 |
| Lake Superior charcoal | 17 25 to 17 50 |

**Finished Material.**—As the time for the agricultural interests to come into the market approaches, there is much interest in the steel bar market. Some of these interests are said to have announced that they will not pay 1.50c, Pittsburg, and to have intimated that 1.40c would be satisfactory, but whether this reduction will be made has not been decided. Bar iron is quiet at 1.55c to 1.60c at the mill. Local mills are well supplied with orders. There is a strong demand for structural material from stock and mills are receiving a fair number of orders. There is no change in the sheets situation.

We quote prices for delivery in Cleveland, adding 9½c freight from Pittsburg: Mill sales of black sheets in carload lots, No. 10, 1.89½; Nos. 11-12, 1.94½c; No. 14, 2.04½c; No. 16, 2.09½c; No. 27, 2.49½c; No. 28, 2.59½c. Galvanized mill sales, No. 14, 2.64½c; No. 16, 2.74½c; Nos. 18-20, 2.89½c; Nos. 22-24, 3.04½c; Nos. 25-26, 3.24½c; No. 27, 3.44 1/3c; No. 28, 3.64½c. Out of stock black sheets, ¼ in., 1.95c; 3-16 in., 2.05c. Blue annealed, No. 10, 2.15c; No. 12, 2.20c; No. 14, 2.25c; No. 16, 2.35c. One pass cold rolled, Nos. 18-20, 2.40c; Nos. 22-24, 2.45c; No. 26, 2.50c; No. 27, 2.55c; No. 28, 2.65c; No. 30, 3.05c. Galvanized out of stock, No 16, 2.80c; Nos. 18-20, 2.90c; Nos. 22-24, 3.05c; No. 26, 3.25c; No. 27, 3.45c; No. 28, 3.65c; No. 30, 4.45c.

**Old Material.**—Dealers report no perceptible movement in the business and practically no sales on which to base prices. We quote gross tons, Cleveland delivery, as follows:

| | |
|---|---|
| Old iron rails | $20 00 to 21 00 |
| Old steel rails (over 6 feet) | 14 50 to 15 50 |
| Old steel rails (under 6 feet) | 14 50 to 15 50 |
| Old car wheels | 14 00 to 14 50 |
| Steel boiler plate | 10 00 to 11 00 |
| Steel axles | 15 50 to 16 50 |
| Malleable iron (railroad) | 14 00 to 15 00 |
| Malleable iron (agricultural) | 12 50 to 13 50 |
| Heavy steel | 13 50 to 14 00 |

We quote as follows, net tons:

| | |
|---|---|
| No. 1 R. R. wrought | 14 00 to 15 00 |
| No. 1 busheling | 12 00 to 13 00 |
| No. 1 machine cast | 12 50 to 13 00 |
| Iron axles | 21 00 to 22 00 |
| Axle turnings | 10 00 to 11 00 |
| Wrought turnings (free from cast) | 9 00 to 10 00 |
| Grate bars | 8 00 to 9 00 |
| Pipes and flues | 10 00 to 11 00 |
| Tank iron | 9 00 to 10 00 |
| Hoop and band iron | 7 50 to 8 50 |
| Sheet iron | 6 50 to 7 50 |
| Wrought drillings | 9 00 to 10 00 |
| Stove plate | 8 50 to 9 00 |
| Cast borings | 6 50 to 7 50 |

## CINCINNATI.

### Southern Iron Declines and Sellers are Eagerly Seeking Business.

June 6.

**Pig Iron.**—Another decline of 50 cents per ton has occurred during the week in Southern pig iron and $12 Birmingham for No. 2 foundry is rather cautiously but freely quoted. Southern iron makers are now in more than a receptive mood and some furnace interests are eagerly seeking business. Reports, stronger than mere rumors, are being circulated that $11.75 has been quoted for No. 2 foundry Birmingham. It would seem that southern producers have come to realize that a downward tendency is inevitable and have decided to meet competition freely on the descending scale until some point be reached at which a halt could be called. In some instances furnaces have refused to go below $12 Birmingham, but others are not positive in their instructions to selling agencies, and are seeking conclusive evidence of lower prices, before authorizing any lower quotations or accepting business on firm offers. It is currently reported that the sale of 500 tons to an Ohio manufacturer of No. 2 soft went at $12.15 Birmingham for quick shipment. Another inquiry for analysis iron has come into the market for 5,000 tons for last half delivery, which the trade generally believes will bring out quotations lower than $12. In a general way there is no increase in the buying and buyers are still maintaining their position of waiting and indifference. Prices are unsettled and the developments as to the level of quotations in the near future is uncertain. One buyer of considerable tonnage stated, during the week, that he would place an order for part of his second half requirements at $11.50 Birmingham and intended to follow the market for the remainder of his needs from that point. The talking point against any further material decline in prices is the fact that production must of necessity decrease while there are no evidences of falling off in consumption. At the same time it is being pointed out that there must be considerable buying for the second half and that this demand will come out at a time when the overworked furnaces will be blowing out for repairs. A number of stacks are reported to be getting ready to cease operations and some hold the view that a lowering of prices is not justified under the present conditions. In northern iron, quotations are fairly well maintained, but in this connection it is to be noted that scarcely any business has been offered, on which to test the market. We quote f. o. b. Cincinnati as follows:

| | |
|---|---|
| Southern Foundry No. 1 | $15 25 to 15 75 |
| Southern Foundry No. 2 | 14 75 to 15 25 |
| Southern Foundry No. 3 | 14 25 to 14 75 |
| Southern Foundry No. 4 | 14 00 to 14 25 |
| Southern Foundry No. 1, soft | 15 25 to 15 75 |
| Southern Foundry No. 2, soft | 14 75 to 15 25 |
| Gray Forge | 13 75 to 14 25 |
| Northern Foundry No. 1 | 17 15 to 17 40 |
| Northern Foundry No. 2 | 16 65 to 16 90 |
| Northern Foundry No. 3 | 16 15 to 16 40 |
| Southern Charcoal | 19 25 to 19 50 |

**Finished Material.**—The demand continues active for most articles on the steel list, especially for structural shapes. Mills are catching up in their orders on certain sizes on some lines of specials. Sheets and plates are rather inactive, but steady. Bar iron continues dull, but not quotably changed. Bar iron is quoted at 1.55c to 1.60c; steel bars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets at 75 and 7½ percent off. We quote black sheets, No. 27, at 2.40c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2.05c; No. 10, 2c. Tank plates are firm and sell out of store at 2c for ¼ in. and 2.10c for 3-16, No. 8 and No. 10. Beams and channels are quoted at 2c from stock and angles at 2c to 2.05c for base sizes.

In merchant pipe the market is quiet and it is intimated that there is some competition for business on the part of the independent mills resulting in a shading of prices. We quote f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts.)

| | Steel Pipe. | | Guaranteed Wrought Iron Pipe. | |
|---|---|---|---|---|
| | Black. Percent. | Galv. Percent. | Black. Percent. | Galv. Percent. |
| ⅛ and ¼ inches | 65.35 | 49.35 | 63.35 | 47.35 |
| ⅜ and ½ inches | 69.35 | 57.35 | 67.35 | 55.35 |
| ¾ to 6 inches | 73.35 | 63.35 | 75.85 | 61.85 |
| 7 to 12 inches | 68.35 | 53.35 | 66.85 | 51.35 |

**Old Material.**—Dealers report the market dull and prices exceedingly irregular. Quotations are nominally unchanged, but could be shaded. We quote:

| | |
|---|---|
| Old No. 1 railroad wrought, net tons | $14 00 to 15 00 |
| Cast machine and foundry, net tons | 11 00 to 12 00 |
| Old iron rails, gross tons | 19 00 to 19 50 |
| Old steel rails, gross tons | 15 00 to 15 50 |
| Old short lengths, gross tons | 13 50 to 14 00 |
| Old iron axles, net tons | 20 00 to 21 00 |
| Stove plate, net tons | 8 50 to 9 00 |
| Wrought turnings, net tons | 10 00 to 10 50 |
| Cast borings, net tons | 7 00 to 7 50 |
| Car wheels, net tons | 15 00 to 15 50 |

**Coke.**—The market is easy with transactions moderate. Foundry coke is quoted at $2.25 to $2.50 and furnace coke from $1.75 to $2 f. o. b. ovens.

## NEW YORK.

### Much Uncertainty Prevails, with Buying Light.

**Pig Iron.**—The market during the past week has been in a curious condition, characterized by a member of the trade as a state of unstable equilibrium. A very little change in either direction may affect prices very considerably. Buying has been light, and prices have suffered no material change except a slight sagging which is inevitable with a waiting market. With the exception of small lots to regular customers, very few orders have been placed. Buyers still seem to be waiting a further drop in prices, while those upon the other side of the market are confident that the demand is merely held in abeyance and will presently come with a rush; some say within a few weeks, while others predict that the reaction will come in the course of a few months. No orders of note for foundry iron were booked during the week, but two or three orders for basic ranging from 750 to 3,000 tons are reported. Inquiries amounting in the aggregate to some 50,000 tons are still floating about, but none have developed further than the test stage. The belief that most of these partake of the nature of "feelers" has been confirmed by fact that two of the most definite inquiries have been put off indefinitely. New York quotations at tide water follows:

| | |
|---|---|
| Northern No. 1 Foundry | $16 75 to 17 25 |
| No. 2 Foundry | 16 25 to 16 75 |
| No. 2 Plain | 15 75 to 16 25 |
| No. 1 Southern Foundry | 17 00 to 17 50 |
| No. 2 Foundry | 16 65 to 17 15 |
| No. 3 Foundry | 16 00 to 16 25 |
| No. 4 Foundry | 15 50 to 15 75 |

**Finished Iron and Steel.**—Producers of structural shapes have no cause for complaint. In some quarters a momentary lull in the demand is welcomed as affording a chance to catch up. A number of fairly large orders have been placed during the week. In addition to the contract for 10,000 tons of structural steel awarded by the Long Island Railroad for the bridge work on its Bay Bridge improvements an order for 7,000 tons for the plant of the Allis-Chalmers Co., at Allis, Wis., and a number of others for smaller amounts have been placed. In plates the demand is all that could be desired with deliveries still in arrears. No change worthy of remark is to be noted in sheets and bars. We quote New York prices at tidewater:

Angles, 3 to 6 in. x ¼ in. and heavier, 1.74½c.; beams, 3 to 15 in., 1.74½c.; channels, 3 to 15 in., 1.74½c.; beams, 18, 20 and 24 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.79½c.; plates, carloads, tank, 1.74½c.; flange, 1.84½c.; marine and ordinary firebox, 1.94½c.; refined iron bars, 1.64½c.; soft steel bars, 1.64½c. to 1.67.; sheets in carload lots, New York, No. 28, black, 2.50c. to 2.55c.; galvanized, 3.60c. to 3.70c.

**Old Material.**—There were no changes of any consequence during the past week. The aggregate tonnage represented by the sales was light, and prices are practically the same as a week ago. While much is said of a prospective improvement in the market, recent developments do not confirm it. It can be said, however, that consumers are talking business a little more freely. Quotations approximately f. o. b. New York follow:

| | |
|---|---|
| Old iron rails | $20 00 to 22 00 |
| Old steel rails, long lengths | 15 50 to 16 50 |
| Old steel rails, short pieces | 14 50 to 15 00 |
| Relaying rails | 20 00 to 21 00 |
| Old car wheels | 15 50 to 16 50 |
| Old iron car axles | 21 75 to 22 75 |
| Old steel car axles | 18 00 to 19 00 |
| Heavy melting steel scrap | 14 50 to 15 50 |
| No. 1 railroad wrought scrap | 18 75 to 19 50 |
| Iron track scrap | 17 00 to 18 00 |
| Wrought pipe | 13 50 to 14 50 |
| Ordinary light iron | 9 50 to 10 50 |
| Cast borings | 3 00 to 5 50 |
| Wrought turnings | 11 50 to 13 50 |
| No. 1 machinery cast | 14 50 to 15 25 |
| Stove plate | 12 00 to 13 00 |

## PHILADELPHIA.

### Summer Dullness has set in—No Cause for Alarm.

June 6.

The iron and steel market seems to have settled temporarily into a condition of stagnation not unusual in June and which excites no great concern among those who desire to see the trade pursue a steady, even course rather than indulge in spectacular booms. Very little new business is coming forward in pig iron, but producers know that there are a number of buyers who have not yet placed their orders for the third quarter, and these must soon be coming into the market or close their establishments, which they have no intention of doing. Knowledge of this condition, and the fact that old orders will keep the furnaces busy for many weeks yet serve to steady prices and prevent any marked decline. Prices are gradually drooping, however. Some good judges hold that they have already touched bottom and that a gradual recovery will soon be in order. Prophecy is idle, of course, in view of the numerous factors that enter into this complicated situation.

**Pig Iron.**—A good idea of the pig iron situation may be

had from the remark of an agent of a well known furnace plant, whose irons have the very highest reputation, that May was the quietest month, so far as new business is concerned, in two years. At the same time the furnaces of this company have orders that will tax their capacity well into the fourth quarter, and the iron is snapped up as soon as produced. Few orders, none of them large, are reported, and a quarter of a dollar is not allowed to stand in the way of a good sale. Southern iron is pressing on the market more urgently, and this doubtless has its effect in depressing prices. These may be quoted as follows:

| | |
|---|---|
| No. 1X Foundry | $18 00 to 18 25 |
| No. 2X Foundry | 17 00 to 17 25 |
| No. 2 Plain | 16 25 to 16 50 |
| Standard Gray Forge | 15 50 to 15 75 |
| Ordinary Gray Forge | 14 75 to 15 00 |
| Basic | 16 00 to 16 25 |
| Low phosphorus | 20 50 to 21 00 |

**Finished Material.**—No essential change is to be noted. Plates and structural shapes continue in the greatest demand, while in the lighter lines, for which this market has chiefly to look to Pittsburg, less activity is reported. Bar iron is expected to come down in price soon, in keeping with the low figures for scrap, but as yet the old price is quoted. Schedule quotations rule, as follows: Beams, channels and angles, according to specifications, 1.77½c to 1.85c; refined iron bars, 1.73½c to 1.80c; steel bars 1.63½c to 1.70c; plates, 1.73½c to 1.80c.

**Old Material.**—Bargain-counter methods prevail in the scrap market, which has weakened again. Dealers, in order to make sales, have cut prices to figures which in some cases must represent considerable losses. Cast borings, for instance, have sold at $8, wrought iron pipe at $11, choice railroad No. 1 wrought at $15, and wrougat turnings at $11. It is not fair to give these figures as the inside range, because they represent exceptional sales, but they indicate the slack demand from the mills. Prices may be quoted as follows:

| | |
|---|---|
| Old steel rails | $15 00 to 16 00 |
| No. 1 steel scrap | 15 00 to 15 50 |
| Old steel axles | 19 00 to 20 00 |
| Old iron axles | 21 00 to 22 00 |
| Old iron rails | 19 00 to 20 00 |
| Old car wheels | 15 00 to 15 50 |
| Choice scrap, R. R. No. 1 wrought | 16 50 to 17 00 |
| No. 1 yard scrap | 15 50 to 16 00 |
| Machinery scrap | 14 50 to 15 00 |
| Low phosphorus scrap | 21 50 to 22 00 |
| Wrought iron pipe | 12 50 to 13 00 |
| No. 1 forge fire scrap | 13 00 to 14 00 |
| No. 2 forge fire scrap, ordinary | 10 00 to 11 00 |
| Wrought turnings | 11 50 to 12 00 |
| Axle turnings, heavy | 14 00 to 14 50 |
| Cast borings | 8 50 to 9 00 |
| Stove plates | 10 00 to 10 50 |

## BIRMINGHAM.

June 6.

There is a better inquiry for iron and a little improvement is noted in the pig iron market in the Southern territory this week. One company today sold 5,000 tons of iron, delivery to be made within 60 days. It is firmly believed here that by July 1 the buying will resume the condition that was noted several weeks ago. Quotations are still off, No. 2 foundry being quoted at $12 per ton, though furnace companies are not anxious to sell any great quantity of the product at that price. The indications are that a 50 cent advance will take place in the next few weeks. The production shows a little falling off this week as compared to what it was a week ago, one furnace having been blown out for repairs, though the statement is made that by next Monday this iron-maker will again be in operation.

Shipments of iron from the Southern territory have fallen off of late and the report of the Southern Iron Committee for the month of May will show a big difference as compared with the aggregate shipments of April.

Four furnaces are being repaired in this district to be placed in commission as soon as the demand warrants it, one of them having been blown out but a few days since to permit of some repairs about the upper part of the stack.

No. 1, foundry, is quoted at $12.50 per ton; No. 2, foundry, $12; No. 3, foundry, $11.50; No. 4, foundry, $11 and gray forge at $10.50.

The steel production is healthy with a strong demand for every ton being manufactured.

Considerable attention is being given to the probable outcome of the convention next week of the United Mine Workers of America. There are many rumors that the union miners at the Commercial coal company mines will be called out on a sympathy strike July 1. This would cripple the industry some, though it is claimed that the furnace companies are not getting any coal from the Commercial coal companies. The leaders of the union miners still decline to make any statements as to what is likely to be done at the convention.

# The Metal Market.

## NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., June 6.

**Pig Tin.**—A covering movement in the London pig tin market has had its influence on prices here. Trading continues moderately firm. Today's closings follow:

Spot, 29⅞c to 30⅛c; June, 29¾ to 30.1c. London closings today: Spot, £1.37⅞; futures, £1.35. Arrivals at Atlantic ports for the month to date, 585, with 243 tons afloat.

**Copper.**—No change of importance was to be noted during the week. One or two foreign developments tended to steady rather than unsettle the market. Today's closings follow: May, 15c; Lake and electrolytic, 15c; casting, 14¾c. London's closings today: Spot, and futures, £65 17s 6d. Exports for the month to date, 2,057 tons.

**Lead.**—Is unchanged at 4.50c to 4.60c. St. Louis is still 4.40c; London, £12 18c 9d.

**Spelter.**—There has been a further decline during the week. Spot is 5.20c; June, 5.25c to 5.30c; July, 5.20c to 5.30c; St. Louis, 5.05c. London, £23, 12s 6d.

**Antimony.**—Prices are considerably higher than last week. Clarkson's is now quoted at 10âc to 11c; Hallett's 10¼c to 11c, and other brands, 10c to 10½c.

## CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, June 6.

The metal market shows little life. Inquiry for copper is of a mild character and the meager trading in progress is at about the old prices. If there is any change slight concessions may be noted. We quote as follows: Lake copper, 15c for carload lots, and 15¼c for less than carload lots. Casting copper, 14¾c for carload lots, and 15c for less than carload lots. Spelter, 5.50c for carload lots, and 6c for lesser quantities. Sheet zinc is without change at 7¼ for carload lots of 600-lb. casks, and 7½ for less than carload lots. Pig tin, 30c for carload lots, and 30½c for less than carload lots. Pig lead, 4.45c for 50-ton lots, 4.50c for carload lots and 4.55c for less than carload lots. Antimony, both Cookson's and Hallett's, is quoted at 9½c.

Consumers are buying old metals generously, when offered at advantageous terms, but the concessions are not readily obtained and trading is moderate. Dealers' quotations are approximately as follows: Copper wire, 13c; heavy copper, 12c; light copper, 11c; red brass, 11c; red brass borings, 9c; yellow brass, 8c; yellow brass boring, 7c. Pipe lead, 4c. Tea lead, 3.60c. Zinc, 4.15c.

During the past week the Robert Mitchell Machinery Co., Detroit, Mich., has increased its capital from $10,000 to $30,000 and the Manistique Iron Co., Detroit, increased its capital from $300,000 to $600,000.

## LITTLE PROGRESS

### Has Been Made in Wage Conference at Detroit.

(Special Telegram.)

DETROIT, MICH., June 7.—A wage conference is being held here between the conference committee of the Amalgamated Association of Iron, Steel and Tin Workers and officials of the Republic Iron & Steel Co.

Owing to delay in arrival of Indiana members, caused by a washout on the railroad, the first session was not held until Tuesday morning.

The Amalgamated Association is asking a return to the scale of 1903-4, which means an advance of better than 18 percent over present wages. The day was spent in the presentation of the association's side of the matter, and in going over the subject in detail. Representatives of the Republic company have taken the matter under advisement, and a further conference will be held.

There are 21 members of the association conference committee, and among those present are Theodore J. Shaffer, president, who acts as chairman; John S. Williams, Pittsburg, secretary; P. McArdle, president-elect, of Muncie, Ind.; William Jenkins and R. H. McGowan, Birmingham, Ala.; Elias Jenkins, Youngstown, O.; W. E. Eagan, Covington, Ky.; and Charles P. Moynihan, Pittsburg.

The Republic company is represented by James H. Nutt and Charles Hart, of Youngstown.

A copy of the proposed scale was furnished the company two weeks ago. The conference will continue several days.

### Jones & Laughlin Steel Co. Needs More Room.

The Jones & Laughlin Steel Co., Pittsburg, is now razing 60 houses on the south side, adjoining its present plant to provide a site for the removal of its 22-in. beam mill from its present location. The mill is now cramped for room and when removed to its new location with the modern appliances that will be added, will have double its present capacity. The removal of this mill from its present location will provide additional room for the other mills thus improving the facilities greatly for handling material.

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The United Sheet & Tin Plate Co., incorporated under the laws of West Virginia for $750,000, was taken over by syndicate at Columbus, Ohio, Tuesday, and the new company was incorporated in Ohio. The main offices of company will be established at Pittsburg. The officers of the reorganized company are: W. S. Ravenscroft, president, Ridgeway, Pa.; M. F. Straus, vice president, Philadelphia; D. C. Taylor, Cambridge, Ohio, secretary; M. S. Kline, Ridgway, Pa., treasurer; D. A. Garden, Steubenville, O., manager. The officers and H. B. Stewart, Canton, O.; J. S. Black, Cambridge, O., and J. E. Eller, Canton, are the incorporators and constitute the board of directors.

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Under date of April 7, 1905, United States Consul-General Richard Guentner, of Frankfort, Germany, reports that fifteen of the leading German manufacturers of steel plates for ships have combined to regulate prices and production.

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Since the first of the year the Westinghouse Air Brake Co., Pittsburg, received orders for equipping 150,000 cars with friction draft gearing. This week an order was received from the Missouri Pacific to equip 5,000 cars.

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The Union Specialty Mfg. Co., Beaver Falls, Pa., has commenced the erection of a plant to manufacture railroad specialties. The main building will be 62 x 337 feet. The company is capitalized at $600,000.

## OBITUARY.

Charles B. Forney, one of the pioneer ironmasters of Lebanon county, Pennsylvania, was buried at Lebanon, Pa., last week. He died in his 84th year and had spent over fifty years in the iron business. He built for the Colemans the first anthracite furnace in the Lebanon valley and was actively interested in the iron business for many years, being most of the time a furnace manager.

Harry B. Black, owner of the Chester Edge Tool Works, died at his home on May 29 after a short illness. He was one of the most prominent citizens of Chester, Pa., and identified with business and church affairs. He had been connected with the Chester Tool Works for years.

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The Norris Safe & Lock Co., Seattle, Wash., through its architects, has received bids for the construction of a five-story block on South Third avenue. This building when completed will be the permanent headquarters of the company.

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The firm of P. Blaisdell & Co., Worcester, Mass., manufacturing machinists, on June 1 dissolved by mutual consent, Enos Earle and John P. Jones withdrawing from the company. Chas. E. Hildreth and William A. Blaisdell will continue the business under the same name and at the old location. They assume all the outstanding liabilities of the company and all the assets have been acquired by them.

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The Homestake Mining Co. has adopted pneumatic haulage for its gold mines at Lead, S. D., and has just placed an order with the Ingersoll-Sergeant Drill Co. for a mammoth duplex four-stage Corliss air compressor to supply the power. The question of haulage has only been decided after thorough and complete tests extending over a period of more than a year. One air locomotive was in service during that time, getting its power from an Ingersoll-Sergeant three-stage air compressor. Fourteen pneumatic locomotives are now to be installed to supersede the present mule service. The compressor to supply air at 1,000 pounds pressure for this service will be the largest high pressure compressor in the world and nearly a duplicate of the high pressure machine which operates the pneumatic haulage system at the mines of the Anaconda Copper Mining Co. There are already seven other Ingersoll-Sergeant air compressors in active service at the Homestake mine supplying 19,413 cu. ft. of free air per minute.

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W. P. Culver, formerly with the Cleveland Motor Car Co., is now the eastern representative of the Diamond Chain & Mfg. Co., of Indianapolis, and will have headquarters in New York.

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A little strike took place at the Duluth mine, at Biwabik, on the Mesabi range, last week, and the mine is now working shorthanded. The men went out for an increase of 15 cents a day in pay, which was not granted.

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Some record breaking shipments of ore will be witnessed at the head of the lakes during the balance of the season of navigation. It is expected that the Duluth & Iron Range and the Duluth, Missabe & Northern, Steel Corporation roads, will each haul more than 1,000,000 tons to their lake ports each month from now on, the season's shipments for the former line being estimated at 7,000,000 tons and those of the Missabe system at 1,000,000 tons more than that. Each now has 1,250,000 tons or more to its credit.

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The water has been pumped out of the first three levels at the Dober mine, at Stambaugh, and the stopes are dry. It will take two weeks yet to unwater the fourth level. As soon as this is done, active mining operations will be commenced, and the Dober will again be the scene of considerable activity.

# THE IRON TRADE REVIEW

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JUNE 8, 1905


## AN UNWISE WAGE DEMAND.

There is now evidence of an intention on the part of the Amalgamated Association of Iron, Steel and Tin Workers to press a rather untimely demand for an advance of about 22 percent in tin plate wages, for the scale year beginning July 1 next.

The advance desired is equivalent to a restoration of the old wage scale which was reduced by 18 percent, in April of last year. The extraordinary conditions surrounding that reduction will easily be recalled. It was almost unprecedented that a reduction should be made during the scale year. The condition was that one manufacturing interest—it happened to be the leading one—had notified the Amalgamated Association that the signed scale was being violated at other plants under the association's jurisdiction, and called upon it either to stop these violations, or to grant the terms openly to all manufacturers. The association confessed its inability to stop the irregularities, and accorded a general 18 percent reduction.

It would require a very important change in trade conditions to warrant the restoration of this reduction, considering the circumstances under which it was made. This change has not occurred. The old wage scale is one which had been in effect, without important modifications, since the summer of 1899, when an advance had been made. In 1901 an unimportant change was made, catchers' wages being advanced 10 percent, while a new tonnage job, that of screwboy, was instituted, entailing a cost to the manufacturers in addition to the amount which had formerly been paid to the screwboy through the roller and doubler. These details are mentioned to show that whatever changes there had been, up to the April, 1904, reduction, were in the nature of advances.

That there has been no change in trade conditions, to warrant the desired advance, is obvious to the tin plate trade, but does not seem to be obvious to the workmen. So far as prices go the evidence is in the opposite direction.

Shortly after the 1899 wage advance was made, tin plate was advanced to $4.65 per box, and remained at that figure until September of the following year. The reduced price of $4 held for two years, when a reduction to $3.60 was made. During all this time the men received the scale which is now sought to be restored, but selling prices were for part of the time more than a dollar a box in excess of the present.

The "jug handled contract" is not understood by the men, apparently, yet it is the most important force in the tin plate trade today. While two successive advances have been made, in November and December of last year, advancing the price of tin plate from $3.30 to $3.55, the great bulk of the material leaving the mills even now is at the old price, through the operation of jug handled contracts.

When the reduction of April, 1904, was made, the nominal price of tin plate was $3.45, and this price was actually in effect. At the present time the nominal price is $3.55, or apparently 10 cents per box higher, but as the cash discount has been increased from 1 to 2 percent the nominal price is only 6½ cents higher. The nominal price, however, is not the real price, through the existence of contracts made at $3.30, less 2 percent, say $3.23 net, against $3.45 less 1 percent, or $3.41 net, the price in April, 1904, a difference of 18 cents.

Prior to the great strike of 1901 there was but one non-union mill controlled by the leading interest, that being the Monessen, where a special system of rolling was practiced. That strike lost the association seven tin plate plants, and it has since lost another, through one of its lodges voluntarily relinquishing its charter.

Through lack of business at the present time, due to the spring and summer buying having been done much earlier than usual, the leading interest is now closing some of its tin mills. It happens that these mills are generally union, and the men may make the charge that the leading interest is discriminating against the union and endeavoring to coerce them. There is no foundation for any charge of discrimination. So far as is known, the only considerations in determining whether or not one plant shall be closed rather than another are the matters of operating cost and contiguity to raw materials and markets. There was a time last fall when the leading interest, out of 242 tin mills, was operating less than 100. At that time there was no wage controversy even remotely suggested, yet it is the fact that for weeks at a time the only union tin mills in operation were the two large ones at New Castle and one small one in the gas belt. Even the two New Castle plants were not run steadily. Through this period the non-union plants were operated with considerable steadiness. The same considerations which governed the selection of mills for closing last

fall are being followed at the present time. If the operating cost is lower in non-union than union mills, it is one for the Amalgamated Association to consider. It was the Amalgamated Association which made them non-union—in 1901.

## MORE ABOUT STEEL RAILS.

The steel railroad tie has not made much progress during the busy time the steel industry has been passing through. Last summer and fall there was a breathing spell during which some of the steel mills devoted considerable attention to the subject. One important interest designed a steel tie which was essentially of a beam section, with the flanges, particularly the lower one, considerably wider than is the case with the ordinary beam section. Several hundred tons of these ties were rolled on experimental orders from a number of railroads. What success has been met by these experimental ties has not been reported, but in one case, that of the Pennsylvania Company, it can be observed that the ties were not laid, but are still piled beside the track where they were placed last fall.

A statement has just been made by Joseph T. Richards, chief engineer of maintenance of way of the Pennsylvania Railroad, on the subject of steel cross ties, which summarizes the objections as follows:

(1) They increase expansion and contraction in all parts of the track.
(2) They weigh about one-half as much as wooden ties and do not make heavy enough track.
(3) The connection of metal and metal between the rail and the tie is very detrimental.
(4) They are noisy.
(5) They have not the elasticity or cushion that a wooden tie has.
(6) They cost more.
(7) They could not be used where our automatic signals are used, because they would connect the current between the rails.

And, lastly, there is no difficulty in getting all the wooden ties we require, and the greatest standard road in England (the London & Northwestern) is now getting 21 years of life out of cross ties by creosoting them at a cost of 15 cents per tie.

These objections of an important official of the Pennsylvania Railroad may explain the indifference of its allied interest, the Pennsylvania Company, to the experimental lot of ties purchased last year. The seventh objection, however, requires further explanation, since it is a fact that near Emsworth Station, on the Pennsylvania Company's Northwest System, where the automatic signals are used, operated by the rolling stock making electrical connection between the rails, there were laid some metal cross-ties last year, which were kept in place for nearly a year, during which time the automatic signals were made to work, although not perfectly. These ties were made from old rails, bottom side up, and surrounded on the sides and beneath with concrete, the flange of the rail furnishing the face to which the rails were bolted. It appears that the concrete did not hold, and that this was the reason the form of tie was abandoned.

As to creosoting ties, it has been stated on good authority that the process decreases the capacity of the tie to resist abrasion, and it is suggested that the success met in England might not be duplicated in the United States on account of the heavier freight cars and loads carried in this country.

While the steel tie may receive a body blow now and then, it may meet with ultimate adoption. Further, the question of adopting a metal support for rails in place of wooden ties does not end with a rejection of the metal cross tie. The longitudinal metallic rail support may yet be developed, and, as has heretofore been remarked in these columns, such a support may be adopted with some decided change in the form of rail section, since the present rail acts partly as a girder. With a continuous support, hard steel might be taken from the rail and be replaced by soft steel in the support, with possible ultimate economy.

### Wm. Tod Co's. New Officers.

At a recent meeting of the board of directors of the William Tod Co., Youngstown, O., held for the purpose of reorganization on account of the death of William Tod, John Stambaugh was elected president, Irving H. Reynolds, vice president and manager, and David Tod, son of the late William Tod, a director to succeed his father. Mr. Reynolds was also elected a director. He was formerly consulting engineer and will assume the position made vacant by the resignation of M. A. Neeland, who was recently appointed assistant to John Reis, head of the new construction department of the United States Steel Corporation.

All of the tin mills of the American Sheet & Tin Plate Co., South Sharon, Pa., are now idle, the remaining ten mills of the twenty having gone off last Saturday. The continuous sheet mill which is being installed at Sharon by this company will probably be placed in operation early in July.

Extensive improvements will be made at Wheeling plant of the National Tube Co. during the next three months. A filtering plant will be installed to purify the water for the blast furnaces and the mills and a mixer is also to be added to the Bessemer department and it is probable that the metal will hereafter be taken direct from the furnaces to the mixer in ladles so that the cupolas will only be used for remelting the iron cast on Sundays and at such other times when the steel plant is idle.

During the month of May the total steel production of the Homestead plant of the Carnegie Steel Co. aggregated 205,000 tons. This exceeds the March production by about 5,000 tons. Open-hearth department produced 80,000 tons, and open-hearth departments Nos. 1 and 2 produced 75,000 tons. The Bessemer plant produced 50,000 tons.

Effective June 1, the pig iron commission house of Walter H. Wallingford & Co., of Cincinnati and Pittsburg, have been made the exclusive selling agents of the Ashland Iron & Mining Co., of Ashland Ky., for the sale of high silicon and Bessemer ferro-silicon pig iron. The Pittsburg office of this company is in the Farmers' Bank building, with Harry O. Price, as selling agent.

One of the blast furnaces of the Tennessee Coal, Iron & Railroad Co., Ensley, Ala., recently produced 366 tons of iron in 24 hours, establishing new record for furnaces in the south. This record is all the more remarkable because the furnace was operated on a 33 percent mix. The coke consumption was close to 2,400 pounds to the ton, which is remarkable for the lean ore that has to be used.

# American Foundrymen's Association Does Much Good.

## OFFICERS ADVOCATE FURTHER EXPANSION.

### Committee Reports to Annual Meeting Contain Vast Amount of Infomation.

(Special Telegram.)

NEW YORK, June 7.—The tenth annual meeting of the American Foundrymen's Association convened at the Grand Central Palace, Lexington avenue and 43rd street, New York, Tuesday morning. The association not being the guest of either the city or the local foundrymen, the usual opening formalities were dispensed with. Chris. J. Wolff, president, called the meeting to order promptly at ten o'clock. In his address he dwelt on the vast strides that have been made in the foundry industry along educational lines since the association was formed nine years ago in Philadelphia. The aim of the association has always been to develop an interchange of ideas on foundry practice, and to promote close personal interest between the different members. Everyone engaged in foundry work, from the molder to the owner, was invited to full membership. Mr. Wolff spoke of the gratifying results that had followed the absorption into the parent body of the Associated Foundry Foremen, and to further strengthen this organization, suggested that a circular letter be sent to each foundry owner soliciting his aid in getting his foremen to join.

"Especially do we invite the foundry owner to get out of his shell and join on the common ground with his employe," said President Wolff. "He will find himself repaid by an increase of loyalty through the growth of mutual sympathy and interest engendered by the principles of our association."

#### Points by Dr. Moldenke.

Dr. Moldenke read his report as secretary and treasurer, reporting the work of the association for the past year and calling attention to the gradual adoption for foundrymen generally of the suggestion of the association, mentioning notably the purchase of pig iron on chemical analysis instead of on fracture, a subject which was thoroughly discussed at the Buffalo meeting. He also called attention to the interest the National Government is taking in the work of the committee on standards, which is covered in the report of that committee. He spoke of the universal recognition which has been given the association's work, both at home as well as in England and Germany, and told of the large and growing correspondence from foundrymen in all parts of the United States, soliciting advice and information on various phases of foundry practice.

The present membership of the association, the secretary said, is 294, sixteen more than last year. The income from dues and all other sources during the year amounted to $2,208.85; expenses, $2,141.91, leaving a balance in the treasury of $66.94. The secretary urged that in view of the discontinuance of the association's journal, the annual dues be reduced to $3. The report of the committee on standards was made verbally by Dr. Moldenke in the absence of Thomas D. West, chairman. He brought out the fact that the United States Government Bureau of Standards was looking into question of possibly taking over the standards of the association, including the samples on hand, and carrying on the work at Washington. It was the request of the committee that it be continued for another year, at which time it expected to be able to make a complete and final report.

#### Correct Pattern Insurance Injustice.

The report of the committee on insuring patterns was also read by Dr. Moldenke, in the absence of the chairman, Frederick Conlin, of Bethlehem. In the course of his remarks, he said the insurance interests of the country have an agreement by which in case of fire they never pay more than 10 percent of the value for the loss of patterns, which is often an injustice to the foundryman because frequently the patterns are worth more than the foundry itself. He recommended that all members of the association press the insurance interests harder to get this injustice corrected and suggested that a system be substituted whereby losses would be paid on a depreciation of 5 percent, per annum for metal patterns and 10 percent, for wooden patterns, the date of the last use of the pattern to be that from which the depreciation is dated. An illustration in point was made of the system in vogue on railroads for insuring rolling stock in which the value of the car is depreciated each year it is in service.

The report of the committee on coke tests was also made by the secretary. H. E. Field, of Mackintosh, Hemphill & Co., of Pittsburg, drew up the plan of operation and Dr. Moldenke carried on the tests. A series of cokes which were made at the exposition were used to melt iron under standard and identical conditions in the cupola of the model foundry at the World's Fair. The results of the 19 tests made will be published by the government later. The secretary added that the lesson to be learned was that if every foundryman watched closely the method of charging and adopting the cupola to the particular quality of coke used they might get much better results than they do, and it would be no longer necessary to swear by Connellsville coke as the only thing to use. For instance, a very light coke which was tried burnt out so quickly in the bed that the iron being brought in contact with the blast burned away over 60 percent. On the other hand, a very heavy coke took so long to burn that very unsatisfactory results were obtained.

#### Carnegie Technical School.

The committee on sandbeds for molds reported progress and requested that it be continued. The committee on trade schools made a report through W. H. McFadden, of Pittsburg, which dealt wholly with the progress of the Carnegie technical schools. It called attention to the fact that among the first buildings to be erected will be that one which contains the foundry. This foundry will be equipped with modern appliances of every description and will be under the supervision of experts in both the practical and theoretical side of foundry practice. Day and evening courses will be given. The instruction in foundry practice will be thorough, and will include the theory and practice of molding, construction of cupolas and furnaces; technology of fuels, chemistry and metallurgy underlying the mixes; construction of flasks; the making of cores, etc. The night course is primarily intended for those engaged in foundry work in the day time and preference will be given these in forming the classes.

#### ASSOCIATED FOUNDRY FOREMEN.

The Associated Foundry Foremen opened its third annual meeting Monday evening, June 5. David Reid, of the Canadian Westinghouse Works, Hamilton, Ont., was elected president to succeed C. H. Thomas. The vice presidents elected included the president of each local organization, together with two vice presidents at large, these being W. H. Nicholls, of the Hill Clutch Co., Cleveland, and Hugh McPhee, of Eaton Cole & Burnham Co., of Bridgeport, Conn. F. C. Everitt, of the J. L. Mott Iron Works, New York, was re-elected secretary and treasurer. The only other business transacted was the adoption of a revised construction which will be published later. In the secretary's report attention was called to the rapid growth of the association. Over one hundred new members and three locals have been added in the past year.

The question is now being discussed as to the advisability of admitting foremen pattern makers to membership in all the local bodies, the probabilities being that the plan will be adopted. A plan is also under advisement to apportion to each local for investigation and discussion various subjects on foundry practice by which method it is reported some definite result will be obtained. The treasury of the organization is in excellent condition, $110.51 being the cash on hand on the date of the annual meeting.

## CORDIAL WELCOME

### Extended to the Mechanical Engineers at Scranton.

(Special Telegram. )

SCRANTON, PA., June 7.—The professional session of the spring meeting ot the American Society of Mechanical Engineers is now in session in this city. Some 200 members registered at the headquarters in the Hotel Jermyn Tuesday and the same evening William F. Mattes, chairman of the local committee, called the opening session to order in the auditorium of the Young Men's Christian Association building. He told of the unforeseen engagement of the city's executive elsewhere, and by way of substitute offered Col. F. L. Hitchcock, as especially representing the Scranton board of trade. The Colonel, although under stress of brief notice, was, nevertheless, in good trim and he was generous in his appreciation of the engineer. He said the world is fond of men who do things and he could imagine the surprise of the old heroes of the past if they could arise and realize the successes accomplished by their successors. He alluded to the prominent engineers of George Stephenson's time and then gave some history of local significance, followed by a cordial expression of good will to his hearers.

President Bender, of the Scranton Civil Engineers' Club, was next introduced and was equally warm in welcome. Mr. Mattes, who was the chairman of the local committee when the American Society of Mechanical Engineers visited Scranton in 1888, was particularly apt with general references and his remarks were exceedingly enjoyable. John R. Freeman, of Providence, R. I., president of the society, followed and touched with witty comment upon the ground traversed by the other speakers. He was one of the contingent to visit Scranton 17 years ago and he had reminiscences replete with pith, pleasantry and pathos. The secretary of the Y. M. C. A. offered all the privileges of the house gratis during the stay of the members in Scranton and similar courtesies were tendered by the Board of Trade. The presentation of professional papers came next and two of these, one dealing with the formation of anchor ice and the other treating of centrifugal pumps, came in for general discussion of much interest and worth.

#### Wednesday's Session.

Wednesday morning announcement of an engineering congress was made through Secretary Hutton. This will be held under the auspices of the Pacific Association of Engineers, including the North Western Society of Engineers and the Technical Society of the Pacific Coast, and will convene at the Lewis & Clark exposition from June 17 to July 1. A representation of the A. S. M. E. will possibly attend. A brief verbal report of the union engineering building was offered by Chas. W. Hunt. Twenty-six plans were submitted to the committee and the examination has been very thorough and they were of the opinion that the best work in sight had been secured. Contractors' bids will be opened on June 20.

President Freeman said the council had elected Charles H. Haswell as an honorary member. Mr. Haswell has celebrated his 96th birthday and bids fair to round out a century. Mr. Supplee had unearthed a literary curio in a first edition of Haswell's book containing a written dedication from the author to his friend, John Ericson. This book will be presented to the library of the society. The next spring meeting of the secretary will be at Chattanooga. Newell Sanders, of that city, was in attendance and convinced his hearers of the eminent desirability of following his advice for a Chattanooga convention. The papers scheduled for the morning came in for animated discussion.

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The Vulcan Iron Works Co., Toledo, O., has shipped one of the Little Giant steam shovels to the Northern Mines Co., Atlin, B. C., to be used in placer work.

## PERSONAL.

Charles Davis, who for several years was chief of the order department of the American Car & Foundry Co., St. Louis, has resigned, and returned to Youngstown, O., his former home, for a rest.

W. H. Brannon, assistant superintendent of furnaces of the Bessemer division of the Tennessee Coal, Iron & Railroad Co., has withdrawn his resignation, and will continue with the company.

E. W. Nash, president of the American Smelting & Refining Co., has been seriously ill for some time, but his condition is reported as improving.

George Whitehouse, of West Bramwick, Stratfordshire, England, foundry manager for the J. & S. Roberts Co., of West Bramwick, will spend three months with relatives at Lorain, O.

Ralph W. Clark, for some years connected with the Chicago office of Rogers, Brown & Co., has been transferred to the Buffalo office, for which he will travel as salesman.

Charles G. Phalen has become associated as salesman with James O'Donnell, 36 La Salle street, Chicago, seller of iron and steel products.

David W. Ross, general superintendent of transportation of the Illinois Central railroad, has been made purchasing director for the Panama canal, and he will move to Washington at once.

Wm. C. Dickerman, formerly general sales agent, has been elected third vice president of the American Car & Foundry Co., and his headquarters are now in New York.

W. P. Eagan, commissioner of the N. M. T. A., is confined to his rooms at the Hotel Media, Mt. Clements, Mich., where he is undergoing treatment for a severe case of rheumatism.

P. G. March, of the Cincinnati Shaper Co. and president of the Cincinnati Metal Trades Association, is confined to his bed with a sprained ankle.

Wm. Lodge, of the Lodge & Shipley Machine Tool Co., has returned from his trip to the Azore Islands.

The American Tool Works Co., Cincinnati, announces that it has appointed Geo. M. Chandler, No. 7 North Illinois street, Indianapolis, selling agent for its line of lathes, planers, shapers, upright drills and radial drills.

Edward G. Caughey has resigned as manager of the Pressed Steel Car Co., Pittsburg, on account of ill health and has been succeeded by John W. Williams, auditor. William F. Fletcher has been appointed assistant to Mr. Williams.

Joseph M. Hayden has been appointed manager of the Duluth, Minn., office of the Jones & Laughlin Steel Co., Pittsburg.

A. C. Dinkey, president of the Carnegie Steel Co., and Thos. Lynch, president of the H. C. Frick Coke Co., Pittsburg, returned from a trip through the Connellsville and West Virginia coal fields this week.

James Lamont, of the Homestead plant of the Carnegie Steel Co., Pittsburg, has been appointed master mechanic of the Donora plant of that company. Harry W. Mohr, recently appointed manager of the Carrie blast furnaces of this company, assumed his duties on June 1. He succeeds Geo. K. Hampfeldt.

Roland S. Le Barre, formerly chief clerk in the sales office of the Carnegie Steel Co. at New Orleans, has been transferred to a similar position in the Cleveland office of that company.

Max McMurray, general superintendent of blast furnaces of M. A. Hanna & Co., Cleveland, has resumed his duties after being confined to his home since last March by a very serious illness.

Warren Eyer, a well-known engineer of Bloomsburg, Pa., has been appointed a member of a commission to examine into the requirements of a bridge at Moflinville, Columbia county, Pa.

## LAKE SUPERIOR IRON MINES.

### Corrigan, McKinney & Co. Add to their Messabi Holdings.

The mine equipment of the Kloman mine, which was bought some time ago by the notorious Flagler Iron & Steel Co., has been attached for the non-payment of a small supply account. Nothing is going on at the mine and the indications are that it will revert to the previous owners.

Old Jackson mine location at Negaunee, which was recently bought by the Jones & Laughlins Steel Co., is to be explored very soon in the hope that large new finds may be made. This is extremely probable, in the opinion of many mining men and geologists of the region.

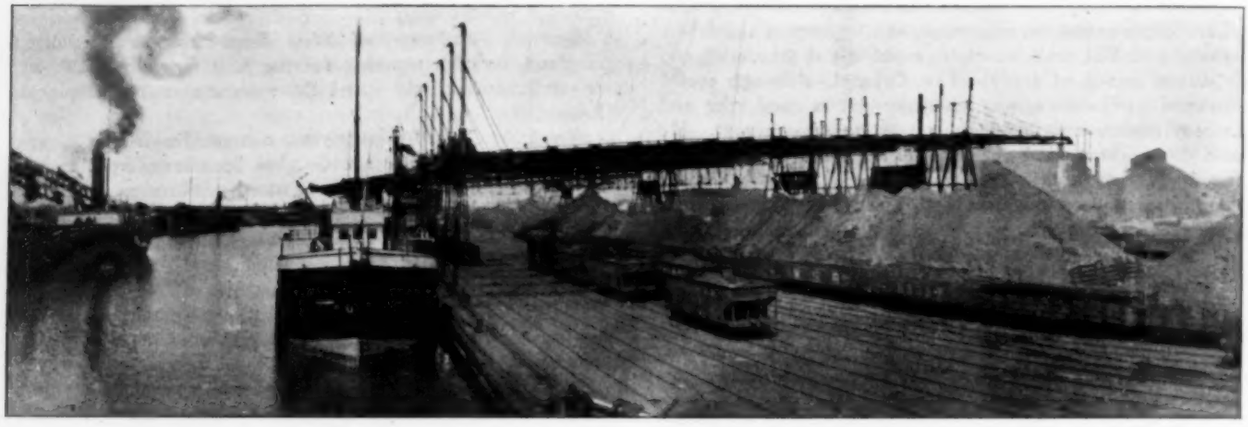
John F. Burke, of Ishpeming, is grading a line for the Northwestern road to the Richmond mine, Cascade range, and will have it in shape for shipment in a few weeks, though it is found to be much more of a job than was anticipated. At the mine a large crusher is going in and a force of men is busy stripping the property for early shipment.

The Oliver Iron Mining Co., which owns the old race track location at Negaunee, is to drill it and hopes to find ore. There is little doubt but that it will have ore, for the operations of adjacent mines leave little room for question. The company bought this tract during the time when it and the Cleveland-Cliffs were fighting for ground on that part of the Marquette range, some two or three years ago. The Maas mine of the Cleveland-Cliffs Co. is a part of the same deposit that underlies this land.

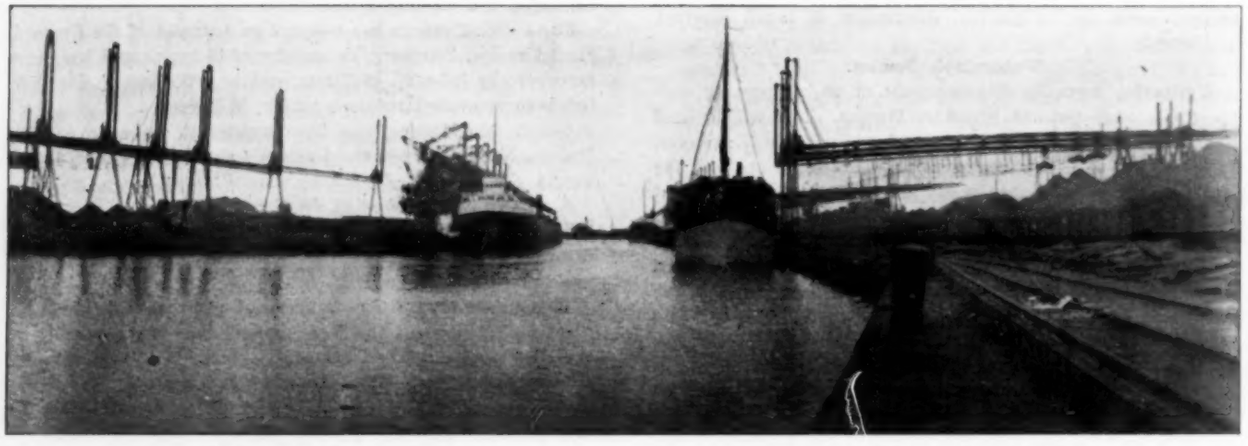
Corrigan, McKinney & Co., Cleveland, have further added to their ore holdings by taking a lease on three forties of land in 48-15, on the Mesabi. The property lies near the Miller mine, immediately north of the village of Aurora. It is south of the original supposed southern boundary of the iron formation, but it has been proved by diamond drilling to contain a large deposit of merchantable ore. The work of development, it is expected, will at once be undertaken, and it is probable that shipments will be made next year. The fee of the property is owned by the Longyear Mesabi Land & Iron Co.

The record was broken by the Lake Superior & Ishpeming docks at Marquette last month, with shipments of more than 300,000 tons. The Duluth & Iron Range road also broke the record by hauling an average of 44,800 gross tons a day for the week, or 313,600 tons in the week. The road has been leasing additional locomotives from the Northern Pacific and is receiving a number of its own new ones. It now has about 45 heavy locomotives in service. Its No. 3 ore dock is not yet in service, and the delay in completing this work, which was under contract to be done May 1, has been a serious inconvenience to the company and shipping.

Dr. A. P. Coleman, who is in the Michipicoten district, reports to the Ontario Bureau of Mines that more than 1,000 tons of iron ore per day are being turned out at the Helen mine, and so far this season 30,000 tons have been shipped. A new shaft 120 ft. has been sunk, which gives access to splendid ore, 400 ft. below the original bed. An iron ore claim is being developed on Lake Anjigoni, about one mile long, which shows a fine quality of magnetite. Power is being developed at the Falls of Michipicoten river, 128 ft. high, to supply the Helen and other mines.



ERIE RAILWAY CO.'S DOCK, RIVER BED, CLEVELAND, O.



C. & P. HOOVER & MASON ON THE LEFT. NYPANO DOCK TO THE RIGHT.

VIEW OF ORE DOCKS AT CLEVELAND.

# Notes on Efficiency of Steam Generating Apparatus.*

BY A. BEMENT, CHICAGO, ILL.

Efficiency in steam generation is a very complicated problem. It is a function of some constants and many variables, therefore it is necessary to consider and take into account the individual features and their influences. Especially is this necessary for proper selection or for the development of superior apparatus, and proper consideration of these matters requires a more exact definition of some terms used, than prevail at present. For example, the word boiler is employed indiscriminately to designate either the boiler proper or the combination of it with other apparatus. Likewise the efficiency of a boiler, and the efficiency which may be produced through it, are commonly considered as being the same.

There is considerable lack of agreement as to what is implied by the term "boiler." The author does not recognize the brick walls which enclose it, the cast iron fire bars, the stoker machine or the furnace as being in any way a part of the boiler. Manufacturers take orders for, and contract to deliver under

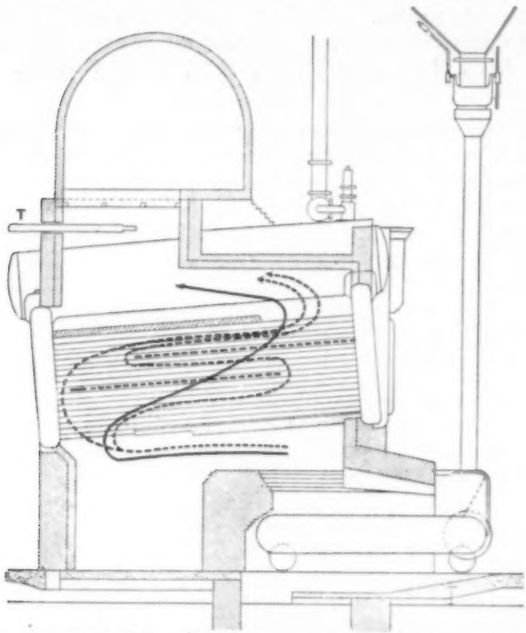



FIG. 1.—ELEVATION IN SECTION, SHOWING BOILERS A AND B.

penalty, what they designate as a "boiler," and they deliver and receive payment for a metal structure, tight enough not to leak, and strong enough to withstand pressure, but no fire bars, stoker, furnace or brick walls are included in the delivery. These features are often supplied by others who are not in the boiler business. Thus a boiler must have an individuality.

**The Boiler and Its Efficiency.**

It is a fact that boilers are of various sizes and shapes, and arranged so that the gases flow in more or less contact with them, by paths of more or less length. Now, as the purpose of the boiler in this connection is to abstract heat from these gases, it must be true that the various shapes and gas passages which are fixed features of the mechanical construction, have an influence on the amount of heat flowing to it. Therefore, this metallic structure, because of features of shape and arrangements of its parts, does necessarily produce an effect, and whatever such effect is, it is fixed and permanent, because it is due to the mechanical arrangement which cannot change, and this is what the author designates as efficiency of a boiler. Other influences may act in conjunction with it, and thereby produce a different result, but this does not change this feature of efficiency of the boiler; it is permanent, and can no more change than the mechanical form and construction. For example, if a good boiler becomes scaled and dirty, this latter influence will produce a new and inferior result, but let another inferior boiler become scaled and dirty, such influence will be the same for each. Likewise a poor fire under a good boiler will produce a poor efficiency, caused, not by the boiler, but by the fire itself; and the same poor fire under an inferior boiler will result in a lower efficiency than with the better boiler. Therefore, this superiority due to the peculiarities of mechanical design and construction cannot vary with no sort of regulation and according to no ascertainable law with every variation in kind of coal and character of fire, because this characteristic is as permanent as the rivets in the boiler itself.

It is useful and necessary to recognize a distinction between efficiency of a boiler and boiler efficiency, the former a constant for any particular boiler, and the latter produced by other influences which may be variable in character and effect, which, acting in conjunction with the efficiency of the boiler produces various results, and effecting the efficiency produced through the boiler.

Furnace efficiency has been defined as the ratio of the total heat delivered from the furnace to the total heat value of the coal consumed. This definition, however, does not take into account the temperature accompanying heat development, which is the most important factor involved, because full heat development is possible at a temperature so low as to make it impossible for any of it to flow into the boiler. Heat development can be of no use to the boiler unless it is at sufficiently

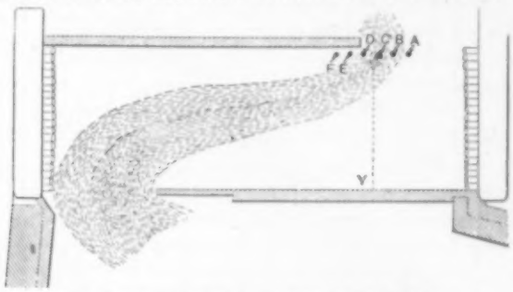



FIG. 2.—ACTIVE PATH OF GASES IN BOILER A.

high temperature for such heat to flow into it. Therefore, a definition of furnace efficiency is incomplete, if it neglects the matter of temperature. It is not only useful but necessary to recognize the distinction between heat and temperature. As in electricity, a small amount of current flows if the voltage is low, but if voltage is high, a large amount will flow in a very small wire; thus the temperature is the motive power which causes transfer of heat from the gases to the water in the boiler, which transfer is in direct proportion to the elevation of temperature.

For a proper understanding of the principles involved, the author considers the fire grate or stoker machine as being no portion of the furnace, which is an intermediary element located between and connecting and grate or stoker and boiler; a chamber in which the gases from the fire are mixed together, wherein the process of combustion which begins at the fire is finished, and where a sufficient mixture between air and combustible may be secured, provided these ingredients are supplied to it in proper proportion. This may be illustrated by assuming a fire brick chamber in which gases of more or less completed combustion enter, together with air, then if thorough mixture be obtained with sufficient air present, combustion will be complete, and if just the required amount of air be present to fully satisfy the combustible gas, an ideal result will be attained, because full heat development will occur together with a minimum quantity of gases, resulting in maximum temperature, provided, of course, that the mixing capacity of the furnace is sufficient.

*Read at the Scranton meeting (June, 1905) of the American Society of Mechanical Engineers.

The proper and most convenient measure of furnace efficiency would be the composition of the gases leaving it, as determined by analysis. According to the above definition, a furnace would not be a portion of some steam generating apparatus; for example, when a grate is located immediately under the boiler. In other cases, such as with many stokers, the furnace feature is only partially developed. With such fuel as anthracite coal or coke, a furnace would have a minimum value, and its maximum value would be realized with bituminous coal.

**The Grate or Stoker.**

This portion of the apparatus should supply the required amounts of fuel and air, and in such relative proportions as to cause a proper balancing of the quantities of air and combustible, or should be so designed and proportioned as to insure such result by proper manipulation, and sufficient mixture between fuel and air should occur at the grate so as not to overtax the mixing capacity of the furnace. In addition, this portion of the apparatus should remove the ash in a manner and at a rate so as not to interfere with fuel and air supply, and at the same time not waste fuel in the ashes. Thus it appears that the function of the grate or stoker is complicated. The plain hand-fired grate fulfills requirements to a minimum, while on the other hand a properly proportioned chain grate stoker fulfills requirements to a maximum extent.

It is not only desirable that the grate or stoker utilize the

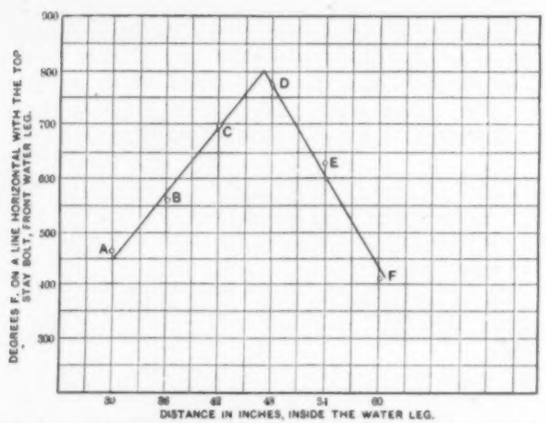



FIG. 3.—TEMPERATURE ACROSS GASES AT EXIT FROM TUBES.

entire amount of fuel, but that it furnish a product suited to the requirements of the furnace, so that it in turn may be able to serve the boiler with a product best adapted to its especial needs.

Therefore it is important and necessary that the individuality of the functions and processes be recognized, because a high efficiency cannot be had from a good boiler if served with a poor fire, or from a good fire if the heat absorption is attempted with a poor boiler.

**Manipulation.**

High heat efficiency in steam generation requires, first, a good apparatus, and second, that it be properly manipulated. The faults of the fireman and furnace operator are well understood and recognized, and he is much to be blamed for poor results. But it is quite the popular thing, however, for the entire blame to be placed on the man who manipulates the fire, when in fact the apparatus is often very faulty, and in some cases very poor results are very nearly all due to the apparatus, yet the man is blamed for the bad engineering of the maker and designer. And often an operating engineer or proprietor seeks in the fireman a degree of intelligence and knowledge of these complicated processes, much greater than he himself possesses.

For better guidance of the furnace operator, the automatic indication of oxygen has been considered desirable. But there is no reason for such device from the standpoint of present knowledge. Should it, however, be available and in use, and the indications were as in the two examples from the same furnace—

| | No. 1 | No. 2 |
|---|---|---|
| Percent oxygen | 5.6 | 7.6 |

what would the fireman consider necessary to increase it in No. 1 or reduce it in No. 2? If an Orsatt apparatus was used to learn what these indications of oxygen meant, the results would be

| | No. 1 | No. 2 |
|---|---|---|
| Carbon dioxide | 13.6 | 11.1 |
| Oxygen | 5.6 | 7.6 |
| Carbon monoxide | 0.0 | 1.1 |

Being guided by the indications of oxygen only, it might appear to the fireman that it should be reduced in No. 2, but combustion is not complete as it is; the indications are that it could be reduced in No. 1, which would not be apparent from a knowledge of the percentage of oxygen only. These two analyses were from a Hawley furnace and taken about two hours apart, No. 1 with a clean fire on the bottom grate, No. 2 with an accumulation of ash and clinker on this grate, and the large amount of oxygen was caused by the amount of coal being burned becoming less, owing to the obstruction which caused the air entering other than through the fuel being proportionately greater. Now, a knowledge of the $CO_2$ would have shown that there was something the matter with condition No. 2, fully as well and probably better than that of oxygen.

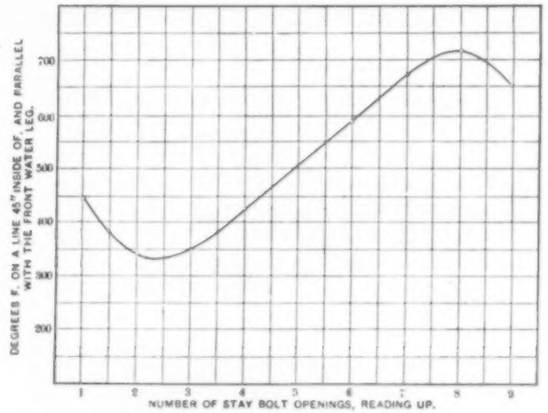



FIG. 4.—TEMPERATURE OF LINE Y OF FIG. 2.

There are now automatic apparatus for the boiler room which continually indicate condition of combustion according to percentage of $CO_2$. The econometer and dasymeter are purely mechanical devices; the gas composimeter and the Ados apparatus are chemical instruments; the latter two make permanent records; the dasymeter is made with and without recorder, and the author has devised and in one case applied a recording attachment to the econometer, which makes a record on a 24-hour circular chart similar to, and as convenient as those from the Bristol recording instruments. No more instruments to indicate condition of combustion are required at present, but what is needed very badly are some more engineers and proprietors who will appreciate and learn to use the instruments which are already available and to impress their value on the firemen by their own example. When it is considered that within about five years nearly every engineering college in this country has added to its equipment either an econometer or similar instrument, and that during this time their use has been largely discontinued, not through any fault of the instrument, but owing to neglect of the important economic feature which they represent, it is an indication that the fireman is not responsible for all of the trouble.

**An Efficient Boiler.**

In a previous paper by the author, results of tests were given of two boilers differing much in efficiency. As no drawings accompanied that paper, it was not clear to what type the tests

referred. For this reason, illustrations showing them are offered. These boilers are designated as A and B, Fig. 1 is an elevation in section showing both in one view. What is designated as B was made by changing the original gas travel by the insertion of two baffles, the location of which is indicated by the broken lines parallel with the tubes. The paths of the gases are shown by arrows among the tube surface, the

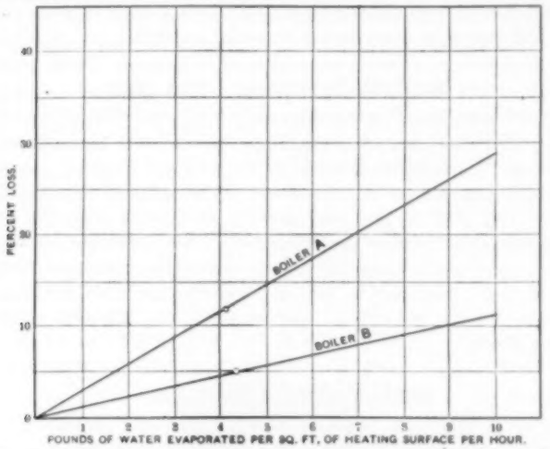



FIG. 5.—LOSS DUE TO INCREASING CAPACITY, MEASURED ABOVE STEAM TEMPERATURE.

heavy full one is for A and the broken arrows for boiler B; therefore to illustrate boiler A, it is only necessary to consider the two inserted baffles and the broken arrows as missing. The improved boiler was not originally made as shown but was produced by changing one of the A type. In this, the first experimental unit, the inserted baffles were of sheet steel, but with others which were changed, because of the value of this improvement, the lower inserted baffle was made with fire brick tiles, and the upper of corrugated steel plates. To insert a baffle required the removal of one row of tubes which were afterwards replaced. It was found by temperature measurements made in the interior of the boiler among the tubes, that

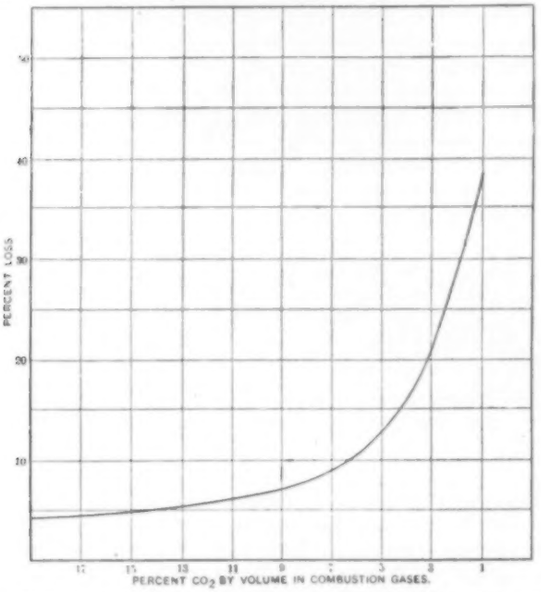



FIG. 6.—LOSS FROM BOILER A OVER B DUE TO DECREASING INITIAL TEMPERATURE, MEASURED ABOVE TEMPERATURE OF AIR.

the openings at the ends of the baffles were greater than necessary, therefore in the change of those that followed, these openings were proportionately decreased, so that at the final outlet at the top of the tubes, this baffle was extended within two feet of the front water leg.

Briefly the results of two kinds of experiments are given in tables Nos. 1 and 2; these tests are given in greater detail in the original paper.

TABLE I.

HORSEPOWER AND FINAL TEMPERATURE.

| | BOILERS. A. | B. |
|---|---|---|
| Complete combustion, $CO_2$ | 10.7 | 10.3 |
| Horsepower developed | 564.3 | 580.4 |
| Final gas temperature | 657 | 469 |
| Steam temperature, F | 379 | 377 |

TABLE II.

HORSEPOWER AND EVAPORATION.

| | BOILERS. A. | B. |
|---|---|---|
| Complete combustion, $CO_2$ | 7.9 | 6.7 |
| Pounds of the same fuel burned per hour | 1,766 | 1,446 |
| Horsepower | 383 | 395 |
| Pounds of steam from and at 212 degrees per lb. of fuel burned | 7.47 | 9.42 |
| Steam temperature, F | 377 | 377 |

In Table No. 1 the difference in efficiency appearing in the final gas temperature, and in Table No. 2 the measure of efficiency is in steam made; while boiler B was supplied with a smaller quantity of heat, it absorbed more than the other.

**Path of Gas in Boiler A.**

Obtaining an exact value for the temperature of the escaping gases is a very difficult matter, well illustrated by Figs. 2, 3 and 4. Referring to Fig. 2, the active path of the gases is indicated according to temperature measurements taken through hollow stay bolts in the front and back water legs of boiler A. The illustration shows the tubes as being absent. Fig. 3 gives measurements made across the path of the gases at the exit;

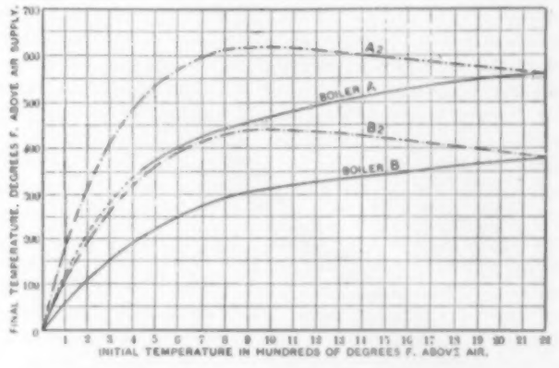



FIG. 7.—RELATION OF FINAL TO INITIAL TEMPERATURE.

the points indicate temperatures at locations shown by corresponding letters in Fig. 2. The curve of Fig. 4 gives temperatures on the vertical line Y of Fig. 2. The location of measurement of the final temperature for each of these boilers is indicated by the measuring instrument shown as T in Fig. 1. This point may or may not have given an exact value, but it is similar for each, and was selected as the best location after much experience with these boilers. The path of the gases shown in Fig. 2 has been referred to as short circuiting, yet they always flow through this boiler in a direct line from the back to the front upper corner and do not pass into the other two corners at any rate of driving when suction draft is used, whatever the rate of driving may be. This may be called short circuiting, yet it is the natural path of the gases.

**Effect of Boiler on Final Efficiency.**

It has been intimated that there can be no advantage in a boiler of superior efficiency over an inferior one, because of the varying effect of quality of fire, rate of driving, etc. And it will be useful to illustrate some of the more important of these effects as applied to boilers A and B, because it appears to have been intimated that these variable influences may efface the superiority of a boiler.

The efficiency produced through a boiler decreases with increase of capacity, on account of increasing resistance to flow of heat through the metal. Therefore, the losses in the hot gases above steam temperature for table No. 1, are indicated by the two points in Fig. 5 at their respective rate of evapora-

tion. Now, if a sufficiently small fire be maintained under these boilers, there would be no loss above steam temperature, or, in other words, this would be a condition of zero loss above steam temperature. It does not matter that radiation from the boiler would carry away a large amount of heat, because this fact has nothing to do with the problem here presented, therefore the effect on these two boilers, caused by increasing capacity may be illustrated by the two curves; these curves are not properly straight lines, however, but should drop off somewhat; the illustration, however, is sufficient. So it follows that the effect of increasing capacity is to produce a diverging result in favor of boiler B.

As condition of combustion has an influence on the amount of heat which will flow to any boiler, it affects the efficiency produced through it. Taking the final temperatures above the air supply of 75 degrees from Table No. 1, the curve in Fig. 6 illustrates the increasing loss caused by boiler A over that of B, with varying excess of air, assuming that the final temperatures of Table No. 1 are constant for all conditions of combustion, and those capacities given. The reason why constant final temperature is assumed is illustrated in Fig. 7. The curve designated boiler A is plotted from simultaneous measurements in the furnace over the fire and at the exit from the boiler. After the first reading was taken, the motion of the chain grate stoker was arrested; this allowed the fire to gradually burn away, which proceeded from the back of the grate toward the front, so when the last set of measurements at 425 initial and 350 final were taken, there was but a small quantity of fire present at the front of the furnace. This curve was produced by decreasing quantity of heat generated and by decreasing initial temperature, the former due to the fire becoming smaller, and the latter to enlarged excess of air with the result that while the initial varied by 518 percent, the final temperature varied by only 36 percent. It is, of course, unnecessary to state that these measurements were not made during the progress of any other experiments. The curve designated boiler B is so located as to represent corresponding relation between initial and final temperature for its boiler and relative condition, and is not plotted from temperature measurements, being located a distance lower on the diagram, corresponding to the difference in final temperature given in Table No. 1. These curves represent one extreme of the effect produced on final temperature by a varying quality of the fire as influenced by the two boilers in question.

Excess of air reduces initial temperature; for this reason, flow of heat to the boiler is decreased and more goes to the chimney, resulting in a higher final temperature. Therefore, low initial causes high final temperature, and when decreasing initial temperature is accompanied by generation of uniform quantity of heat or by increasing quantity of heat, the final rise inversely to that of the initial temperature to a marked extent. This, the other extreme, is indicated for the two boilers by curves $A_2$ and $B_2$. Taking the effect produced by varying qualities of fire and initial temperature as illustrated by the curves showing the extremes, it appears that the curve of average final temperature would be a horizontal line beyond the point of 950 degrees initial.

But it makes no difference whether the final temperature is based on the average as illustrated, or on either of the extremes indicated by the curves, all show the increasing value of boiler B over A as the fire becomes poorer; while, on the other hand, as the quality of the fire, or, in other words, initial temperature increases, the value of the fixed and unvarying efficiency of a boiler becomes less, not owing to any change in the boiler itself, but in the effect produced on it by the fire. So that as the initial temperature rises the resulting efficiency produced through these boilers comes nearer together.

The author considers that these boilers, A and B, represent the extreme ranges of efficiency, possessed by what would be called first-class boilers, and it is his present opinion, if such or corresponding boilers be served with a very good fire, the resulting efficiency produced through them will equal a fuel saving of 10 percent for the better over the poorer, at a capacity of one horsepower developed per each 10 sq. ft. of heating surface, and this would be the minimum measure of value between them. But, as the condition of combustion becomes poorer, the effect of the value of a more efficient boiler becomes greater, and a purchaser would always realize benefit from it, which would not be the case with a good furnace and stoker over poor ones, unless properly operated.

### National Tube Co's. Plant Idle.

The entire plant of the National Tube Co., Wheeling, W. Va., was shut down on Saturday, June 3, for an indefinite period. The two blast furnaces were blown out and will be relined and will be idle for about three months. The Bessemer steel plant is also idle and will hardly resume until the repairs to the furnace are completed. The Semet-Solvay coke oven plant which furnishes coke to the furnaces also went out, as it was impossible to find a disposition for the coke elsewhere for the present at least owing to the dullness of the coke market.

### Equipment for 10,000 Cars.

The Baltimore & Ohio Railroad has placed a contract with the Westinghouse Air Brake Co. for the equipment of 10,000 freight cars with the friction draft gear manufactured by this company. Beginning with July 1 the cars are to be equipped and a premium has been offered for the early completion of the work. When this order is filled the B. & O. will have 25,000 cars equipped with this gear and the work of equipping the remaining 85,000 cars will proceed as speedily as possible thereafter.

### More Cars for Japan.

The American Car & Foundry Co. has received an order for 500 freight cars from the Japanese Government. These cars are to be delivered as speedily as possible.

The Twin City Rapid Transit Co., Minneapolis, will install in its power house at the lower dam, St. Anthony's Falls, a vertical cross compound Reynolds Corliss condensing engine, for direct connection to a 3,500 k. w. 3-phase alternating current generator. This company has previously installed 3 Allis-Chalmers engines as the same size and type as the one now ordered, each having a normal capacity of 5,000 h. p. The four engines are, however, capable of developing an aggrgeate of 36,000 h. p.

Relative to the reports concerning the intention of the United States Steel Corporation to build a $10,000,000 plant in Canada, E. H. Gary, chairman of the board of directors, says: "We have given some consideration to the question of establishing an iron and steel plant at some point in Canada; but no decision has yet been made, and may not be made for some time. Any statements contrary to the above are not authorized."

The annual meeting of the stockholders of the American Car & Foundry Co. will be held at the company's office, Jersey City, N. J., June 29, for the purpose of electing a board of directors and transacting such other business as may be brought before the meeting.

F. O. Schroedinger, manufacturer of roofing and sheet metal architectural work, Columbus, O., has removed from his old plant on West Goodale street to his new and modern plant, 146-148 North Third street. The new plant is a six-story brick building, equipped with modern machinery and the output will be greatly increased.

## HAMMER DRILL FOR ROCK EXCAVATION.

A new machine drill has been placed on the market by the Ingersoll-Sergeant Drill Co., of New York, for use in the field of rock excavation. The machine has been given the distinctive name of the "Little Jap" hammer drill; and while recently introduced it is not an experiment, but has been presented to the public only after severe tests in actual service. The device differs radically from rock drills of standard design. The latter are developed from the original churn drill, in which the steel was lifted and allowed to fall against the rock. In the new machine, however, instead of a few blows of a heavy hammer the steel receives many blows of a light and rapidly moving hammer.

The drill is marked by the distinctive features of design which characterize the Haeseler pneumatic tools built by the same company. Its most pronounced novelty is the use of the axial valve. As its name implies, the axial valve has a movement around a fixed axis or trunnion, the necessary motion in opening and closing the ports being produced by the difference between a constant air pressure on the short wing of the valve

FIG. 1.—THE NO. 2 "LITTLE JAP" DRILL.

and an intermittent pressure on a longer wing. It is a departure from the more common forms of reciprocating valves having a straight line motion.

The new hammer drill is made in three different styles, adapting it for a variety of service. Numbers 1 and 2 are intended for hand use and are furnished with a hand grip and finger throttle valve. Number 1 has a simple, positive, automatic rotating mechanism mounted in the front head. This style uses solid steels and is intended for drilling pop holes and similar very light work in mine or quarry. It may be operated in either horizontal or vertical positions and uses either a flat, diamond point, or cross bit.

The No. 2 has no automatic rotation but carries a hand lever by which the entire tool can be swung back and forth through a portion of a circle, thus drilling a round hole. Hollow steels are used with this type through which a portion of the air discharge passes to the bottom of the hole, blowing out the chips and clearing the hole in advance of the bit. To avoid the unpleasant effects of blowing the chips out of the hole into the face of the operator, a collar is fixed on the cylinder through which a portion of air is discharged against the mouth of the hole, throwing the cuttings to the side instead of outward. A further advantage of the hollow steels lies in the fact that the cold discharge air passing through them cools the metal and retains the temper of the bit. The No. 3 also uses hollow steels and has the collar discharge for laying the dust. But it differs from Nos. 1 and 2 in being provided with an air power feed in place of the hand grip. The feed cylinder may be mounted on a column, bar or tripod, as in ordinary drill service. Air admitted behind the plunger forces the drill and steel forward against the rock, holding them there and feeding forward automatically as the hole deepens. The travel of the feed plunger is 16 in. and a single hose and throttle supplies air for both feed and cutting. Nos. 2 and 3 are intended for somewhat heavier service than No. 1. They are equally adapted for either hard or soft rock and will drill holes up to a diameter of 1½ in. to a depth of 48 in. Their performance depends, of course, upon the nature of the material worked in; but in hard granite or quartz a rate of 4 to 5 in. per minute can be easily maintained in a 1¼ in. hole; while in sandstone, limestone and similar soft materials, 8 to 10 in. per minute can be easily made. One man can easily drill 150 feet of hole per day, equivalent to the hand work of 10 or 12 men.

The drill steels are made throughout of the best quality of weldless hollow steel. The shank is hexagonal in section, hardened; it slips easily into the front cylinder bushing and is struck by the hardened steel hammer, with no tendency

FIG. 2.—THE NO. 3 DRILL MOUNTED ON COLUMN FOR MINE WORK.

whatever to batter or spread in either element. A rosette-shaped cutting bit is used and the steels can be re-dressed so long as any material remains. Solid steels of round or cruciform section may be used, where the nature of the material demands it. The new drill is especially intended for the lighter demands of excavation, such as putting in plug and feather holes, sinking pop holes, drilling anchor holes, stoping, squaring up, cutting hitches, trimming walls and like work. It is a valuable adjunct to the machine equipment of mine, tunnel or quarry, not only as a rock drill but also as a pneumatic tool. With a chisel bit inserted instead of the drill bit, it may be used as a chipping hammer; or by substituting a rivet set it may be used as a riveting hammer in repairing boilers, ore cars, mine buckets, skips and other metal work.

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A petition in involuntary bankruptcy has been filed by Syracuse creditors against the Hyle Bros. Steel Co., of Syracuse, N. Y.

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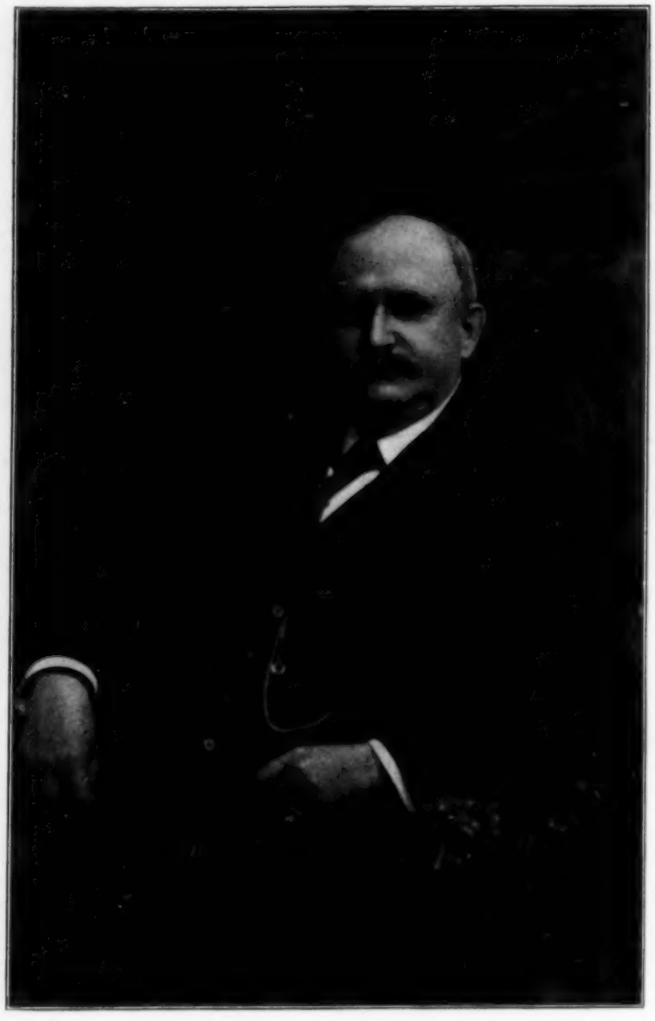
The Bennett Engineering & Steam Specialty Co., Arcade building, Cleveland, has made arrangements with James Bonar & Co., Inc., Pittsburg, Pa., to represent it in all its specialties in the Cleveland district. Geo. G. Bennett, until recently, was state examiner of engineers in the Cleveland district, and his partner, R. J. Bissett, has also been prominent in engineering circles.

## DEATH OF PETER L. KIMBERLY.

Peter L. Kimberly, one of the pioneer iron masters of the Shenango Valley, and one of the most remarkable characters in the country's iron trade, passed away suddenly of heart failure at the Grand Pacific Hotel Chicago, on Sunday morning, June 4. Until five years ago his activities were almost entirely limited to the development of his iron ore holdings in the Lake Superior region, and to his mills located at Sharon, New Castle and Greenville, Pa. After disposing of practically all these interests he sought investment in the West, and the Annie Laurie ore mine in Utah and extensive copper properties which he owned are said to represent a valuation well up in the millions. With Frank Buhl, of Sharon, he was also interested in the Twin Falls Development & Irrigation Co. of Idaho, a gigantic project for reclaiming vast acreages in the Snake river district in Idaho. To the deceased belongs the honor of first recognizing the value of the vast ore deposits on the Mesabi range in the Lake Superior region, and as early as 1892 he was the sole owner of the Biwabik mine on this range, which has been one of its greatest producers, but about seven years ago it passed out of his hands to the present owners. He was also interested in the Adams mine on this range, disposing of his interest in 1893.



PETER L. KIMBERLY.

Mr. Kimberly was born in Austintown, Trumbull Co., O., on Jan. 6, 1846, and went to Sharon, Pa., with his father, Samuel Kimberly, when a boy of 15. His father was one of the first coal operators in the Weathersfield, O., district and later owned and operated the Keel Ridge mines in Mercer County, Pa. At this place he also operated a small blast furnace and rolling mill, among the first plants of its kind in that section of the country. After leaving Hiram College, Peter became associated with his father, but later purchased an interest in the firm of Alexander Ashton & Co., operating a nail mill at Sharon. The firm name was changed to Kimberly, Ashton & Co., in 1868, and later Ashton dropped out and the firm name was again changed to Kimberly, Carnes & Co. In 1883 Mr. Kimberly was practically the sole owner of the property and the plant was operated under the name of P. L. Kimberly & Co. In 1871 he built an iron mill at Greenville, Pa., and was also largely interested in the Atlantic Iron & Steel Co., New Castle, Pa., operating blast furnaces and a rolling mill. In 1899, the Greenville and Sharon plants were absorbed by the American Steel Hoop Co., and when the United States Steel Corporation was formed, these properties were taken over by the Carnegie Steel Co. The Sharon plant was razed, and on its site has recently been erected the ordnance plant of th Driggs, Seabury Ordnance Co. The plant of the Atlantic Iron & Steel Co. was absorbed by the Republic Iron & Steel Co. and is now operated by that concern. Throughout the nineties Mr. Kimberly was absorbed in the development of ore properties on the Mesabi range and but for business reverses would have become one of the largest operators of these deposits. Mr. Kimberly was vice president and a large stockholder in the Bassett-Presly Co., Cleveland, one of the large jobbing concerns of the Central West.

While his career was dotted with reverses due to the vicissitudes of the iron and steel business, his energy and pluck always enabled him to restore his wealth and the fortune he leaves is reputed to be great. About three months ago he was advised that he was suffering from heart trouble, but less than ten days ago was in Pittsburg, suffering little inconvenience from his affliction. Owing to his large western interests he established an office in Chicago a few years ago, and while he was in that city much of the time he still maintained his home at Sharon, where he lived over forty years, and where the remains were laid away on Tuesday. He never married and is survived by one brother, Amos Kimberly, of West Liberty, Ia., and one sister, Mrs. Kate Murdock, of Salt Lake City.

Concerning Mr. Kimberly's operations in the Lake Superior district, one who has been thoroughly familiar with them sends *The Iron Trade Review* the following:

"Mr. Kimberly was heavily interested in the early development of the great Mesabi range. He it was who, as head of the Hamilton Ore Co., backed John T. Jones in the steam shovel development of the Biwabik mine. This was a matter requiring the utmost vigor of thought and originality of execution, for the steam shovel method of mining on a large scale appealed to none, among leading men, and it was like flying in the face of providence to do anything against their sanction. The Biwabik operation was a large one and took a great initial investment. Messrs. Kimberly and Jones saw not only the immediate cost of getting down to ore and commencing its mining, but they saw the ultimate necessity of immense openings to handle trains, long cuts into and out of the deposit, etc. That the Biwabik experiment involved them in debt and caused the bankruptcy of the Biwabik company, was not due to any error on their part, but to the changed conditions. The Biwabik was the first Mesabi mine to be well and scientifically explored and measured. Mr. Kimberly was also in the original Fayal exploration and lease, with David T. Adams, of Duluth, and they sold to the Chicago & Minnesota Ore Co., which later became part of the Minnesota Iron Co. He was

interested in the lease of the Adams mine, at Eveleth, with Mr. Adams, and he and his partner sold to the Lake Superior Consolidated Iron Mines. In the lease of the Spruce mine also at Eveleth, Mr. Kimberly bought out his partner, and sold to the United States Steel Corporation. He bought the holdings of A. E. Humphries, one of the feverish speculators of the early day, who was then called—most unjustly to the real discoveries—the "Columbus of the Mesabi range." These holdings were near Virginia, and included several companies. Later they formed the basis of the holdings of the Jones & Laughlins Steel Co. in Minnesota. In addition to the other daring operations on that iron ore range Mr. Kimberly was the purchaser of a large tonnage of high grade ore, on long term contracts, from the Rockefeller company at what were afterwards seen to be ridiculously low prices, and which contracts he was able to turn into large blocks of stock in some of the steel manufacturing concerns later organized. Of late he has been little interested in Minnesota, but with Mr. Jones has been developing several properties the past season, and now, in the Menominee and Cascade ranges of Michigan."

## German High-Speed Locomotives.

John F. Winter, United States consul at Annaberg, Germany, in a communication to the Department of Commerce and Labor writes as follows under date of April 10: "High-speed trials with steam locomotives on the military railway between Marienfelde and Zossen have been carried out during the past few months. It would appear that the superheated steam engine, which was on probation, has given the greatest satisfaction. Coupled to three corridor cars, the engine covered the measured course at a mean rate of 135 kilometers (84½ miles) an hour, and, drawing twice that number of cars, at the rate of 128 kilometers (80 miles) per hour. The superheated steam locomotive referred to is not a new invention, being employed on the Government railway lines. It is proved to have developed a speed of about 100 kilometers (62½ miles) an hour. The trials have shown that this type of engine is more powerful than the usual type of express locomotive, in that it can cover greater distances without changing, and is more economical in coal and water consumption. It is stated, however, that it requires about 22 percent more lubricating oil.

"The engine which was tried is a 2-4 coupled express engine, with 'Schmidt superheater,' weighing, all told, 85 tons, of which 35 tons represent the four-axled tender. The engine which is to be tested next time is one built by Henschel, of Cassel, and weighs about 30 tons more. In the trials up to the present, the maximum speed attained by an ordinary type of express engine was 123 kilometers (77 miles) an hour, with three cars, and only 108 kilometers (67½ miles) with six cars attached. In engineering circles it is generally considered that the two-cylinder superheated steam engine has been the most successful."

## Canadian Industries.

TORONTO, CAN., June 5.—The market is very active with large importations. The building operations this season promise to be very expensive both in Toronto and Montreal, and many extensive contracts are being let. The Traders bank will erect the first sky-scraper as yet built in Toronto, 15 stories, the contract for which has been taken by V. J. Head, Sons & Co., New York.

J. H. Ballantine, of the Neptune meter and brass works, New York, was in Ottawa last week. The company is looking for a site for a Canadian branch, which will employ about 80 hands.

J. H. Plummer, president of the Dominion Iron & Steel Co., of Sydney, N. S., who has been ill for some months, is convalescent and will shortly leave on a trip South.

The Macdonald Tin Plate Co., Toronto, has purchased the assets of the Canada Tin Plate & Decorating Co., of Hamilton, for $19,000.

The following companies have been incorporated under the laws of Ontario:

Selby & Youlden, Ltd., head office Kingston, capital $50,000; to manufacture engines, machinery, etc. Provisional directors: Charles Selby, Henry Youlden, and Melville F. Thompson.

Maple Leaf Automobile & Electrical Mfg. Co., Ltd., head office London, capital $50,000. Provisional directors: James O. Welden, Donald Ferguson, George H. Rapson, Hiram S. Albertson and Wm. Barton.

Pease Heating Co., Ltd., head office Toronto, capital $40,000; to manufacture heating, plumbing and steam fitting apparatus. Provisional directors: David Millar, Alex. M. Bond, R. B. McKinnon, James M. Bell and Fredrick W. Johnson.

Canadian Shovel & Tool Co., Ltd., head office Hamilton, capital $150,000. Provisional directors: John C. McCarty, Geo. B. McCarty, Chas. H. Holton, Frederick Skelton and Wm. A. Holton.

Canadian Fence Mfg. Co., Ltd., head office Woodstock, capital $250,000. Provisional directors: Charles A. Brink, Noah Stickney, Geo. Bragg, James B. Murray and Thos. H. Blatchford.

## Exports of British and American Machinery to Mexico.

The following statements are compiled in the Bureau of Statistics, Department of Commerce and Labor, from British and American official publications, and show the exports of machinery and implements from the United Kingdom (calendar year) and the United States (year ended June 30) to Mexico in 1903:

*United Kingdom.*—Implements and tools, $170,566; locomotives, $70,905; agricultural steam engines, $47,462; other steam engines, $140,773; mining machinery, not steam, $25,856; textile machinery, not steam, $247,306; other machinery, not steam, $318,537; all other machinery, $23,194; total, $1,044,599.

*United States.*—Agricultural implements, $330,910; machinery, machines, and parts of, not otherwise designated, $4,755,095; sewing machines, $490,238; steam engines, and parts of, $1,692,622; total, $7,262,865; total British, $1,044,599; excess of American machinery, $6,224,266.

In addition to the foregoing, American builders' hardware, saws and tools, to the value of $704,601, were exported to Mexico during the year. There are no available statistics at hand covering the exports of machinery from Germany to Mexico.

The July issue of *Air Power*, the technical quarterly devoted to compressed air and its uses and published by the Rand Drill Co., will contain among other things, a complete description, illustrated by diagrams, of a displacement pump, written by Prof. E. G. Harris; a description of a recent installation of a compressed air mine haulage system by A. A. Bowman, M. E.; "The Uses of Compressed Air in the Wood-Working Shop," by W. R. Hulbert, M. E.; a description of the construction of the new Duluth aerial bridge; an article on the Philadelphia high pressure pumping plant; a practical article on air compressor foundations, by E. M. Mackie, M. E.; three new inventions as follows: A new tunneling machine, a pneumatic stake driver used by Barnum Bailey, and a device for conveying hot rivets through a metal tube by compressed air.

The Western Steel Car & Foundry Co., Anniston, Ala., has received an order for 1,000 cars to be built for the Missouri Pacific railroad. The working force at the Anniston plant will be considerably increased.

The 15-foot iron flywheel in the Licking Rolling Mills, Covington, Ky., burst May 27 and wrecked a portion of the Mill. It is thought that the plant will have to shut down for about two weeks.

## VENTING OF CORES.*

BY JAS. A. MURPHY, FRANKLIN, PA.

The proper venting of cores has been a theme upon which foundrymen could base interesting argument. Bad venting has always furnished a ready made excuse for a bad casting by the molder; indeed, when he could think of nothing else to lay the blame on, the core was sure to come in for a bad character and the core maker's ability was criss-crossed with suitable and expressive adjectives.

Not all molders recognize the degree of skill that is required to vent some crooked cores properly, nor do all coremakers realize how necessary it is to have vents through which the gas will flow easily and without any unnecessary obstruction.

The evolution of the air compressor, gas engine and automobile has set the brightest minds in the business experimenting, seeking a remedy for the poorly vented cores that cause such disturbances at casting time. The proper venting of this class of cores is a far more skillful operation than most people are ready to allow, and it is only seldom that the coremaker has the proper facilities to do the job properly. The core shop is the most neglected part of our foundries today and it is only within a few years that it has been given any notice at all. It is a hopeful sign of the times, however, to see foremen and employers in general waking up to its necessities and its possibilities.

The pulling of wires and soaped strings around corners as a means of venting is a thing of the past. The wax wire method of venting has come into our foundries to stay. All

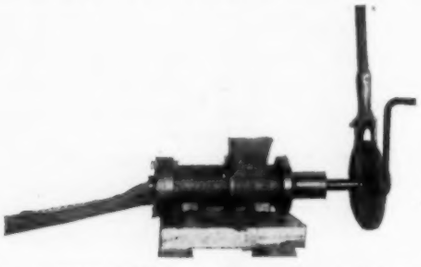


FIG. 1.—PRESS WITH WAX WIRES BEING FORCED OUT.

methods of wax wire venting are not by any means satisfactory.

The wax taper with a string of threads running through it gives very poor satisfaction, that with the wire through it is better but its cost is an item of no small consideration and many foundries prefer to do without it and continue to lose casting on this account. The object of using the wax, of course, is that the core while drying absorbs the wax, leaving only the string of wire which when pulled out leaves an open and free hole.

If the string gets burned on the end it is a difficult job to pull it and if it breaks inside the core is cannot be extracted An imperfect vent is the result and a possible blown casting.

The wax wires, Fig. 1, are the result of much experiment to do away with strings of any kind in the wax, in fact, to have something that was as nearly fool-proof as possible.

The element of cost was also a consideration and the composition used is made at less than one-eighth of the cost of any wax on the market today. The illustration of the machine, Fig. 1, gives a fair idea of the process of manufacture. A helper will turn out enough of different sizes in about one hour to last 30 coremakers one day, so the cost of manufacture is infinitesimal, once the installation is made.

These wires are easy to handle, are not sticky except when hot, are as tough as twine when at the right temperature, and can be made in coils of any length or cut off in desirable lengths and laid away in trays ready for instant use. There is no waste as the pieces not used, short ends, etc., are again put back in the machine and pressed out as new wires.

The thickness is regulated by the die. In practice I make them from 3-32 to ⅜ in., but any desired size can be made. The material is very light and I have known men not to use a pound all day venting the most complicated jacket cores for air cylinders.

The skill of the coremaker is considerably minimized in producing a perfectly vented core, as it is impossible for him to do otherwise if he rams up a string of this wax in the proper parts of the core. It is not claimed that this wax will take the place of rods, but its absorption by the sand in baking has a very decided tendency to strengthen the core.

Several cores that must be made in halves in order to be properly vented can be made in one piece by this process at a considerable saving of time and expense.

Since I designed this machine and brought this method of venting cores to what I consider a state of absolute perfection, in the shops of the Chicago Pneumatic Tool Co., at Franklin,

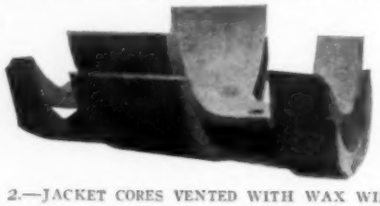


FIG 2.—JACKET CORES VENTED WITH WAX WIRES.

Pa., blown cores are a thing unknown in our foundry where every casting is filled with them and where work of the most intricate character is the rule rather than the exception.

I cannot lay too much stress upon the time saving qualities of this machine. Venting is at best a tedious and time-killing operation no matter how it is done, but with this wax all that is necessary is to ram up the string in the proper place and the job is done permanently and well.

The ingenuity of the most expert designer in producing crooked orifices for which cores must be employed in the production of the casting, is defied, for as long as there is left any opening through which a small pipe can be passed a perfectly vented core can be made by this process.

Several foundrymen who have seen the process in operation have pronounced it one of the most important inventions for the cheap and safe production of intricate work.

FIG. 3.—CYLINDERS AND CORES. THE PHOTOGRAPH REDUCES THE CORE MORE THAN THE CYLINDER. THE VENT IS ALL TAKEN THROUGH X X.

Its cost of installation being very small, the cost of the material not worth mentioning, no waste material, the accessibility of all sizes of strings in any quantity at a moment's notice and the perfection of the cores that it is used in, are all points very much in its favor of being later as universally adopted as the core making machine.

I consider it absolutely indispensable in shops which make a specialty of pump, engine, air compressor, gas engine, automobile or other intricate or delicate work. In several of these shops its savings in the course of a year would run well into the thousands of dollars.

*Read at the New York meeting (June, 1905,) of the American Foundrymen's Association.

## PLASTER OF PARIS IN THE FOUNDRY.*

BY EDWARD B. GILMOUR, PEORIA, ILL.

Plaster of Paris is gypsum burnt in a kiln at a temperature of 250 degrees and subsequently powdered and ground to a fine uniform flour. When so prepared it possesses the valuable property when mixed with water of setting into a solid mass. It receives its name from the fact that it is mined in great quantities in the environs of Paris and is used to a large extent in art work. It takes a place in the foundry in the form of patterns; some founders use it to a large extent in making match boards. These match boards are not very satisfactory if they are kept in constant use as they are brittle and consequently very easily broken. While upon this topic I would say that good match boards are made from a mixture of litharge 3 parts, parting sand 90 parts, and linseed oil 7 parts.

In a large agricultural establishment with which I was formerly connected we used as much as 20 barrels of plaster of Paris per month, so it can be readily seen to what extent the material was used in this one place. It was the means of saving thousands of dollars in producing their work. We used it principally in the making of patterns for drop hammer dies in order to straighten the malleable castings which had become warped in the process of annealing.

Some one may wonder why we use the original patterns in order to make the plaster patterns. The reason is simply this, that when you cast the dies from the original patterns you have the shrinkage of the casting in the die, and you have also the shrinkage upon the malleable casting. It will be said that malleable castings shrink more than gray iron, which they certainly do. In making the patterns for malleable castings we allow the same shrinkage as in gray iron, viz., one-eighth inch to the foot, but with the process of annealing the castings they expand enough to bring "malleable" to a uniform size with gray iron castings, consequently the castings are of the same size as the impression in the dies.

The accompanying cut shows two sets of drop dies for the pipe connections for a grain weighing machine, the smaller ones being used for the top dies. The method for making these plaster casts is a little more intricate, the molds being made as you would make a regular loam mold, with sweeps having a frame made of the flat section, with pin holes on the centers, so that the sweeps will work on the circle as you would make a regular elbow or Y pipe.

In order to get as true and perfect castings as possible we are very careful not to rap the patterns sideways, only a slight tap downwards being given. When the pattern is drawn no tools are used upon the face of the mold; simply take a camel's hair brush with wet blacking and carefully paint this on as regularly as possible; afterwards skin-dry the mold and you will have a perfect casting. We usually make these molds in iron flasks so that we can leave them over night in the sand as it tends to toughen the metal, which, in fact, is a high grade iron. These castings are subjected to very heavy strains on account of the continued pounding of the drop hammer.

SET OF DROP DIES.

Our method of procedure was to take the original metal patterns before being gated up, place them in the sand as you would if you intended to cast them; viz., up to the joint, making the joint in the regular fashion and as straight as possible. It is good practice to prove the drawing of the patterns so as to get the joint in the best place in order to get out the malleables after having been straightened. Now get a common wooden box, place over the mold, see that it has plenty of taper so as to facilitate the drawing of the plaster cast from the sand. Coat the mold with oil, mix the plaster with warm water (as you will get better results in setting), to the consistency of thick cream. Pour it into the box or flask upon one-half of the mold, and when solidified roll it over and take away the sand which made the original mold, leaving the patterns in place. Dress up the joint, again coating over the mold with oil, and repeat the operation upon the plaster mold, which will give you a perfect impression of the casting which you have to straighten. It is essential to cast a nut or something similar into the plaster in order to draw the plaster pattern out of the sand after it has become hard enough. It is necessary to trim up the mold, separate it and withdraw the patterns, repair all of the defects, and give the casts a coating of shellac varnish. They are then ready for use.

*Read at the New York meeting of the American Foundrymen's Association, June 6-8.

### Demand for American Machinery.

Mexico City papers state that one result of the exceptionally good crops being harvested throughout the republic this year will be a material increase in the demand for agricultural machinery by the great haciendados. This applies especially to threshing machines and reapers, on both of which American manufacturers have the call. And this is almost equally true of all other machinery and utensils used in agricultural pursuits.

The Tennessee Co.'s Little Belle furnace, at Birmingham, after an idleness of three weeks, has resumed operations, it being entirely relined and refitted.

The Davis Foundry & Machine Co., Rome, Ga., has been organized with a $25,000 capital for the manufacture of turbine water wheels and ore washers and to do a general repair and machinery supply business. The company will erect a plant in Rome, Ga.

## MOLDING A PROPELLER WHEEL.*

BY A. M. LOUDON, ELMIRA, N. Y.

The present era demands from every foundry owner castings at the lowest cost. To turn out the orders and keep the cost on the right side of the ledger foundry foremen are often taxed with phenomenal propositions. As many foundries in this country make propeller wheels of varying dimensions and as there are so many different ways adopted to make them, I have taken this opportunity to bring before the notice of foundry owners and foremen what I consider the best method. Many are daily making these castings under some other method, which costs much more and does not secure as perfectly balanced a wheel as the method described.

Through the kindness of Thomas Sherriff, of Milwaukee, the writer had the privilege of photographing the rigging here-

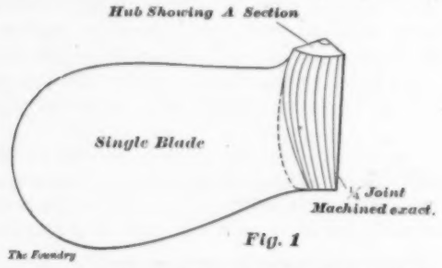



*Fig. 1*

in described for the making of the wheel molds, together with the opportunity of seeing a 10-ft. wheel, four blades, molded and closed to cast, and could have seen the casting but was limited. This mold was made in dry sand by two molders and from the time the first cope was laid on the floor until the iron was poured into the mold the time elapsed was thirty-two hours. Now I fancy I can hear some of you laugh at this statement, but I believe that if some of you here that are interested in the manufacture of propeller wheels would follow the method applied in that little foundry in Milwaukee, you will be convinced that it is about time that you quit the old fashioned way of sweep and loam mold.

I have included a sketch of a blade with a perfect quarter hub, Fig. 1, also the cope, both views, together with the nowel.

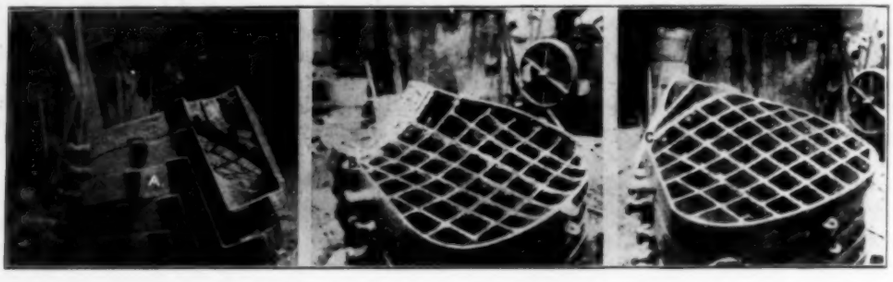


FIG. 2.—A SIMPLE METHOD TO MOLD A PROPELLER.

To begin the molding the cope it laid down anywhere on the floor, filled with sand and rammed ordinarily, then shoveled off to the sweep of the flask. The pattern is then laid on the sand and made solid, the nowel is then put on and facing sand riddled on. The sand is shoveled on to a convenient depth and rammed, repeating until ramming is completed; the excess sand is shoveled off and butted, two wood screws are inserted into the pattern and secured to lift pattern and save moving cope; the nowel is then lifted off, rolled over and set down handy to the heap on a bed, the joint is made, one of the other copes is then put on and rammed up as on an ordinary dry sand mold. The joint around hub is made perfect, shaving off one-eighth inch of the total depth of hub, leaving the sand containing print and under full size of pattern for an exact circle when closing up. The cope is lifted off pattern, drawn and placed back in false cope which was first used. The second blade is then rammed up as the first, using the same precaution for hub joint, then the third. Next the fourth nowel is rammed up, joint made and false cope shook out, as it is no longer required for any other purpose, the cope being rammed up and joint made as the other three were, cope is lifted off, pattern drawn and put away; on account of two molders working on this with a helper, when the last blade is rammed up the other three blades are finished ready for the oven and in a very short time the fourth is completed, the car loaded and put into the oven, where it is baked in one night. Next morning a level bed is struck off on a special part of the floor with a ring bedded on it. The flasks are then taken from the oven and brushed off, each cope going on the nowel it was rammed to anywhere on the floor. The first blade is then placed on the bed and a plumb level is used on the joint of the hub, which sets the blade exact pitch and level. The second blade is then placed on bed, using the joint of the first flask and the plumb level on the opposite joint and so on with the other two. The last one is set by size sticks which bring the hub to a perfect circle, and the quarters being true uprights, secures the wheel spaced to with one-quarter inch of exact quarter circle each. Then the molder who closes the mold, as there is only one doing this job with the helper, fixes up the hub joints while the helpers get the curbing around the flask and ram it up, covering the hub with a cake core and secured with cross bars and wedges. He can easily get his mold ready by two or three o'clock.

*Read at the New York meeting of the American Foundrymen's Association, June 6-8.

### Two Kinds of Scotch.

The *Ironmonger* publishes the following caustic little article:

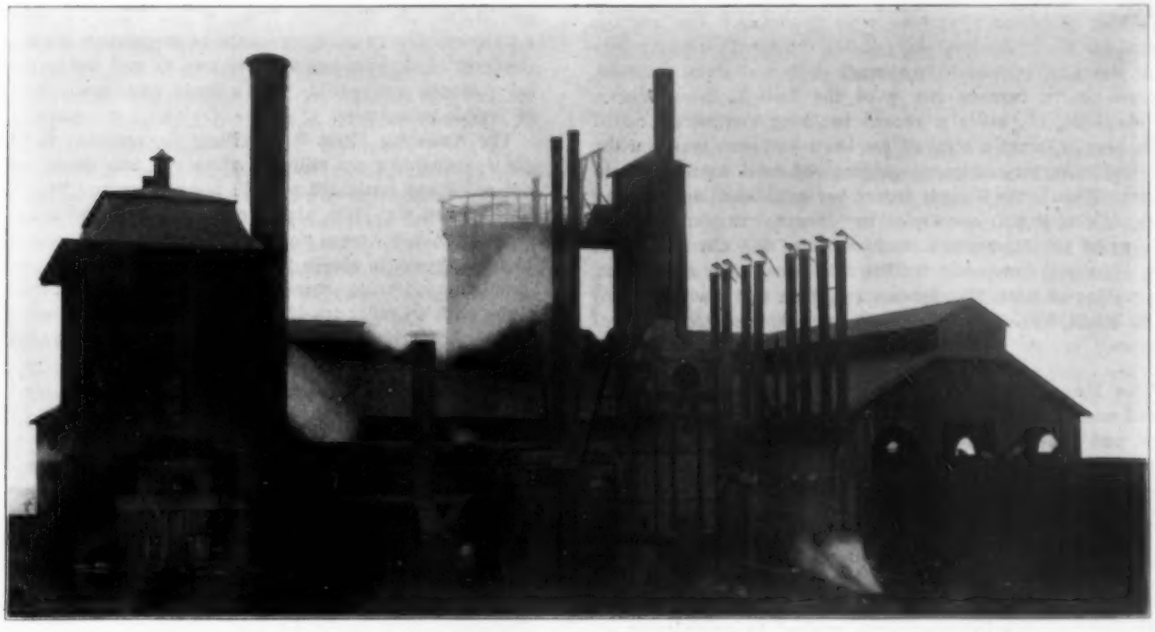
"The Clacton Urban District Council, overflowing with patriotic zeal and loyal exuberance, has carried a resolution that the cast-iron pipes for which tenders are being invited shall be made from 'English' pig iron. This will be pleasant news for the manufacturers of pipes cast from Lincolnshire, Derbyshire, and Cleveland pig iron; but what has Bonnie Scotland done to have fallen under the ban of Clacton Bumbledom? It is fortunate for the Essex local magnates that Canada's bounty-fed iron is not now being 'dumped' here in tens of thousands of tons, as it was a few years ago, for this iron was largely cast into pipes, and the limitations of the Clacton Committee might have brought about a Colonial grievance which would have led to the disruption of the Empire. Perhaps, however, it is merely slipshod use of their mother tongue, or a blind belief that whatever is not foreign is 'English,' that has led the assembled Solomons of Clacton to offer an affront to Scotch iron. Possibly, the only kind of Scotch with which the Clacton Urban Council is acquainted comes out of a bottle. Its members may never have heard of a Scottish iron industry."

The stockholders of the United States Cast Iron Pipe & Foundry Co. will hold their annual meeting June 28.

# The Furnace of the Hudson Iron Company.

The blast furnace plant of the Hudson Iron Co. at Secaucus, N. J., does not embody all the latest improvements known to modern furnace practice, and it possesses several features which must at best be considered a disadvantage, yet its going into blast a few weeks ago has caused no little stir in iron circles in lower New York. Its equipment would scarcely commend itself to iron men of the Pittsburg and Birmingham districts, but the arrangement of the parts is simple and economical and its location is so convenient for shipments of metal at short notice to the foundries of the vicinity, that the producers who have supplied the local market for the last twelve years see in the newly opened plant a formidable rival.

The Secaucus Furnace, as the plant is known in the neighborhood, is situated almost within sight of New York City on the Hackensack river. It is only a few miles from the Jersey City terminals of the railroads which cross the salt marshes to reach the metropolis. Attached to the property are some 550 acres of land lying along the east bank of the river which affords several miles of water front. The furnace lies midway between the main tracks of the Delaware, Lackawanna and Western, and the Erie railroads, and short spurs of both roads run into its yards. A dock at the water front offers facilities for cheap transportation to all points on Newark and New York Bays.



BLAST FURNACE AT SECAUCUS, N. J.

The plant has undergone little alteration since it was built in 1879, and has lain idle for the greater part of the time since 1893. It was operated for a few months about two years ago by the Eastern Iron Co. Since it passed into the hands of the present owner, The Hudson Iron Co., it has been thoroughly overhauled. The furnace stack was originally built with a view of smelting with anthracite coal exclusively. Its dimensions are: height, 65 ft.; bosh, 17 ft.; and hearth, 10 ft. There are nine 4-in. tuyeres. The output three weeks after blowing in was from 75 to 80 tons a day. The normal capacity on the charge now being run is estimated at about 100 tons.

The blast is supplied by a single upright Morris blowing engine of seven feet stroke. The diameter of the steam cylinder is 48 in.; and that of the blowing cylinder, 90 in. The steam is supplied by three tubular boilers, one vertical, and two of the Babcock and Wilcox type. Perfect combustion of the gases from the furnace is secured by means of fan draft.

The blast which enters the furnace at a pressure of from six to seven pounds is heated by means of four Cooper-Hewitt U-pipe stoves, a hot-blast arrangement still in use in many foundry iron plants throughout the east. With the moderate volume of blast employed—the engine makes about 20 revolutions a minute—there is no difficulty in maintaining the temperature at 1050 degrees. It is the intention to increase the capacity of the plant to from 150 to 175 tons a day. With this end in view another blowing engine and the necessary boilers will be installed within the next few weeks.

The ore mixture at present employed includes ores obtained from various mines in New York and New Jersey, and a considerable proportion of Cuban ore from Juragua. The latter presents, in bulk, a curious appearance. Every color known to mineralogy is present in the pile; from green, due to copper stains, deep red and dull gray to the yellow of pyrites and the white of quartz. This ore contains more or less sulphur and how to keep this element in the product down below foundry limits is one of the metallurgical problems.

The fuel employed consists of coal and coke, the proportion being varied to meet changing conditions. The furnace is tapped in the old way, four times a day, into sand molds. Concerning the method of disposing of the cast the general manager, Albert Trinler, said: "Yes, no doubt it is not quite up to date, but there are still a considerable proportion of foundry men who prefer sand pig. They select their iron according to the fracture and when the metal is chilled the absence of the open grain gives them a sense of something lacking. We have no difficulty in disposing of our product."

The slag is tapped into a runway, broken up, and loaded upon cars in the old way, but a modern slag-car arrangement is in course of construction, and this part of the operation will soon be simplified.

"The local trade need have no fear as to cut prices," remarked Mr. Trinler. "We have advantages in supplying the nearby foundries but we do not mean to throw our advantages away. That is where we expect to make our profit."

Disposing of the output is the least of the manager's troubles. The average composition of the pig iron produced is a partial explanation:—silicon, 2.50 to 3.00 percent; sulphur,

.02; phosphorus, .75; manganese, .40; graphitic carbon, 3.25 and combined carbon .25 percent.

The present ore mixture is only a temporary expedient, it being the purpose to employ only the product of the company's own mines as soon as the latter can be put into shape. The properties now in course of development are expected to yield an abundance of material within the next few months. One situated in St. Lawrence Co., New York, includes a body of hematite running from 50 to 55 percent of iron, while a magnetic ore containing from 60 to 65 percent of the metal will be obtained from a tract in Orange Co., New York, less than forty miles distant from the stock pile.

## NEW RECORDS

### Made by Open-Hearth Plants at Sharon, Pa., and Steubenville, O.

During the month of May the open-hearth plant of the Carnegie Steel Co., Sharon, Pa., produced 36,337 tons of steel as compared with 35,411 tons the best previous month. This plant contains twelve 50-ton furnaces and the daily average output of the plant was 1,346 tons, although the biggest day was May 31, when 1,615 tons were produced. The average output for the 27 working days during the month for each furnace was 3,026 tons and the average daily was about 112 tons.

Open-hearth furnace No. 7 of the LaBelle Iron Works, Steubenville, O., made a record breaking run which ended with May 31, when a total of 501 heats had been made on the original refractory bottom, bringing the total tonnage up to 27,557. This is the biggest record yet established for tonnage with relining in this country at any open-hearth plant, furnace No. 13 of the Homestead steel works of the Carnegie Steel Co., Pittsburg, heretofore holding the record with 26,700 tons. In number of heats this furnace is still in first place with 702 to its credit, having operated for 12 months without change of bottom.

The Hassell Iron Works, Colorado Springs, Colo., last week made the largest iron casting ever turned out in that city, and one of the largest made in the West. It weighed 7,000 lb., was 10 ft. in diameter and 42 in. deep. It will be used by the Lamar sugar beet factory.

The Tennessee Coal, Iron & Railroad Co. is bringing its coal mines in the Pratt division up to the highest standard and already improvements have been made which will greatly increase the output. Electrical haulage is to be installed and the improvements rushed to completion.

The Lowellville furnace of the Ohio Iron & Steel Co. has been blown out for extensive repairs. A new casting house will be built and when active operations are again resumed, the Lowellville furnace will compare favorably with any in the valley.

The sheet mill of the Phillips Sheet & Tin Plate Co., Clarksburg, W. Va., resumed operations last week. This company recently purchased the plant of the Jackson Iron & Sheet Co., which was idle for nearly a year. John Usher has been appointed superintendent of the plant.

The Carnegie Steel Co., Pittsburg, has received contracts for steel ties from the Pittsburg Railway Co., Pittsburg, and the Pennsylvania Railroad Co., aggregating eight miles. The type of tie that is being manufactured by this company has been in successful service on the Bessemer & Lake Erie railroad for some time and the Lake Shore also has a considerable mileage in use.

The Marion Tank Co., Marion, Wis., proposes to move its plant to Sheboygan, Wis.

# WAGE SCALES

## WILL BE CONSIDERED IN TWO CONFERENCES.

### Demand of Sheet and Tin Workers will be Refused—Other Labor News.

The conference between the Amalgamated Association of Iron, Steel and Tin Workers and the American Sheet & Tin Plate Co. to decide on the sheet and tin plate scales for the year beginning July 1, will be held in Pittsburg the week of June 26. This week the conference on the iron scale with the Republic Iron & Steel Co. is on at Detroit. The demand for an increase of 22 percent in the wages of the tin workers and 18 percent for the sheet workers will not be granted by the American Sheet & Tin Plate Co., nor the independent manufacturer, and unless a satisfactory compromise can be arranged indications point to an opening of the sheet and tin mills of the former on a non-union basis. In the event of no agreement resulting in a strike, it is probable that the independent sheet and tin mills now operating under the Amalgamated scale will likewise attempt to operate on a non-union basis. In none of the non-union mills is there any limit to the output and should the American Sheet & Tin Plate Co. succeed in non-unionizing its mills, it would be imperative for the independents to operate on a similar basis, as with the limit of output removed and possibly with a lower wage scale, they would be unable to compete.

The American Sheet & Tin Plate Co. operates 19 tin plate plants containing 242 mills, of which ten, containing 171 mills, are union and nine with 71 mills are non-union. There are 17 independent tin plate plants containing 107 mills, of which three have never been operated or are in litigation. Of this number there are eleven with 68 mills that operate under the Amalgamated scale, three with 23 mills are non-union and three with 16 mills are idle. The union and non-union mills of the American Sheet & Tin Plate Co. and the independent manufacturers are as follows:

*American Sheet & Tin Plate Co.*

| Union Tin Plate Plants. | No. Mills. |
|---|---|
| American, Elwood, Ind. | 28 |
| Anderson, Anderson, Ind. | 7 |
| Falcon, Niles, O. | 6 |
| Humbert, Connellsville, Pa. | 6 |
| LaBelle, Wheeling, W. Va. | 10 |
| Laughlin, Martins Ferry, O. | 23 |
| Morewood, Gas City, Ind. | 8 |
| Greer, New Castle, Pa. | 20 |
| Sharon, Sharon, Pa. | 20 |
| Shenango, New Castle, Pa. | 30 |
| Pennsylvania, New Kensington, Pa. | 6 |
| Pittsburg, New Kensington, Pa. | 7 |
| Total | 171 |

One of the two New Kensington mills is now practically on a non-union basis, as the lodge among the men has surrendered its charter and it is probable that the men in the other plant will likewise surrender their charter and withdraw from the association. The Amalgamated wage scale was signed for these two mills last year.

*American Sheet & Tin Plate Co.*

| Non-Union Tin Plate Plants. | No. Mills. |
|---|---|
| Cambridge, Cambridge, O. | 6 |
| Chester, Chester, W. Va. | 7 |
| Crescent, Cleveland, O. | 6 |
| Monongahela, Pittsburg | 8 |
| National, Monessen, Pa. | 25 |
| Star, Pittsburg | 8 |
| United States, McKeesport, Pa. | 11 |
| Total | 71 |

*Independent Manufacturers.*

| Union Tin Plate Plants. | No. Mills |
|---|---|
| Alcania Co., Avonmore, Pa. | 3 |

| | |
|---|---|
| Carnahan Sheet & Tin Plate Co., Canton, O. | 6 |
| Follansbee Bros. Co., Follansbee, W. Va. | 6 |
| W. H. Griffiths Co., Waynesburg, Pa. | 9 |
| Griffiths Charcoal Iron Tin Mills, Waynesburg, Pa. | 2 |
| McClure, Co., Washington, Pa. | 6 |
| National Enameling & Stamping Co., Granite City, Ill. | 6 |
| Pope Tin Plate Co., Steubenville, O. | 12 |
| N. & G. Taylor Co., Cumberland, Md. | 8 |
| Whitaker-Glessner Co., Wheeling, W. Va. | 4 |
| Atlanta Tin Plate Co., Atlanta, Ind. | 6 |
| Total | 68 |

The Whitaker-Glessner plant at Wheeling is closed at present, a strike having been declared some time ago, and the future policy with reference to resuming on a union or non-union basis will depend entirely on the result of the wage conference.

*Independent Manufacturers.*

| Non-Union Tin Plate Plants. | No. Mills. |
|---|---|
| McKeesport Tin Plate Co., McKeesport, Pa. | 10 |
| Standard Tin Plate Co., Canonsburg, Pa. | 5 |
| Phillips Sheet & Tin Plate Co., Clarksburg, W. Va. | 8 |
| Total | 23 |

The tin plate plant of the Juniata Steel & Iron Co., Greencastle, Ind., is idle and there is no date for its resumption. It contains six mills. The plant of the Marietta Sheet & Tin Plate Co., containing four mills, is likewise idle. The plant of the Morgantown Tin Plate Co., Morgantown, W. Va., containing six mills, is incomplete and was recently sold by order of the court. It is reliably reported that the last sale was made to the Continental Can Co., of Chicago.

The American Sheet & Tin Plate Co. operates 15 sheet plants containing 163 mills, of which only five with 47 mills are union and the remaining ten with 116 mills are non-union. The association is very weak among the sheet mills of this company, and if desired only the non-union mills could operate and supply a demand slightly below normal. There are 24 independent sheet mills containing 145 mills, the independent manufacturers in this line being much stronger than in the tin plate trade. The strength of the Amalgamated Association, on the other hand, is strongest among the independent manufacturers, controlling 13 plants with a total of 90 mills, while eleven with 55 mills are operated non-union. The union and non-union plants are as follows:

*American Sheet & Tin Plate Co.*

| Union Sheet Plants. | No. Mills. |
|---|---|
| Aetna-Standard, Bridgeport, O. | 23 |
| Cambridge, Cambridge, O. | 7 |
| Mihland, Muncie, Ind. | 7 |
| Piqua, Piqua, O. | 4 |
| Struthers, Struthers, O. | 6 |
| Total | 47 |

| Non-Union Sheet Plants. | No. Mills. |
|---|---|
| Canal Dover, Canal Dover, O. | 19 |
| Hyde Park, Hyde Park, Pa. | 5 |
| Leechburg, Leechburg, Pa. | 10 |
| New Philadelphia, New Philadelphia, O. | 10 |
| Saltsburg, Saltsburg, Pa. | 4 |
| Scottdale No. 1, Scottdale, Pa. | 9 |
| Scottdale, No. 2, Scottdale, Pa. | 8 |
| Vandergrift, Vandergrift, Pa. | 29 |
| Wellsville, Wellsville, O. | 10 |
| Wood, McKeesport, Pa. | 12 |
| Total | 116 |

*Independent Sheet Manufacturers.*

| Union Sheet Plants. | No. Mills. |
|---|---|
| American Rolling Mill Co., Middletown, O. | 5 |
| Ashland Sheet Mill Co., Ashland, Ky. | 4 |
| Empire Rolling Mill Co., Niles, O. | 6 |
| Follansbee Bros. Co., Follansbee, W. Va. | 2 |
| Whitaker-Glessner Co., Wheeling, W. Va., and Martins Ferry, O. | 13 |
| Licking Rolling Mill Co., Covington, Ky. | 3 |
| Louisville Bolt & Iron Co., Louisville, Ky. | 2 |
| National Enameling & Stamping Co., St. Louis, Mo., and Granite City, Ill. | 24 |
| Newport Rolling Mill Co., Newport, Ky. | 11 |
| Waynesburg Forge, Sheet and Tin Mills, Waynesburg, Pa. | 2 |
| Youngstown Iron & Steel Roofing Co., Youngstown, O. | 6 |
| Youngstown Sheet & Tube Co., Youngstown, O. | 6 |
| Zug & Co., Pittsburg. | 6 |
| Total | 90 |

The sheet mills of the Whitaker-Glessner Co., Martins Ferry, O., and Wheeling, W. Va., are closed at present on account of a strike. The mills were operated for a short time non-union, but were later closed pending the result of the sheet wage conference. It it proves satisfactory, it is probable that the mills will resume on a union basis.

*Independent Manufacturers.*

| Non-Union Sheet Plants. | No. Mills. |
|---|---|
| Allegheny Steel & Iron Co., Avenue, Pa. | 8 |
| Canonsburg Steel & Iron Co., Canonsburg, Pa. | 5 |
| Interstate Steel Co., Avenue, Pa. | 2 |
| Muskingum Valley Steel Co., Zanesville, O. | 4 |
| McCullough Iron Co., Wilmington, Del. | 4 |
| Inland Steel Co., Indiana Harbor, Ind. | 8 |
| Parkersburg Iron & Steel Co., Parkersburg, W. Va. | 6 |
| Stark Rolling Mill Co., Canton, O. | 6 |
| Tuscora Steel Co., Newcomerstown, O. | 3 |
| Wilkes Rolling Mill Co., Sharon, Pa. | 2 |
| Alan Wood Iron & Steel Co., Conshohocken, Pa. | 7 |
| Total | 55 |

A large number of sheet and tin plate mills will close before July 1, on account of the falling off in demand, and those that continue in operation until that time will do so largely to make up stock either preparatory to a shut down after the middle of the year or to produce as much finished material on the lower wage basis as possible. The demand for tin plate with specifications is about 50 percent of the producing capacity of the mills, and while only 36 of the tin plate mills of the American Sheet & Tin Plate Co. are idle at present, 70 will be down before the middle of the month, the Shenango works at New Castle, containing 30 mills, to shut down shortly for repairs.

## METAL TRADES ASSOCIATION NOTES.

The regular monthly meeting of the Executive Board of the St. Louis Metal Trades Association will be held Tuesday, June 6.

J. W. Gardner, president of the National Metal Trades Association, paid a visit to Cincinnati on Wednesday, June 7.

The regular monthly meeting of the New York Metal Trades Association is called for Thursday, June 8.

There is no falling off in the demand for machinists in Pittsburg.

Two of the local unions of Philadelphia Chandelier Makers have been expelled from the International Brass Workers' Union for non-payment of their per capita tax. Both of these unions have reduced their dues 33⅓ percent to hold their membership.

The International Association of Machinists is opening a vigorous campaign in Philadelphia. The initial move in this direction was the opening of permanent headquarters for one of the vice presidents.

The Pattern Makers' League of North America, one of the strongest of all the crafts employed by the Metal Trades, has presented to the Philadelphia Metal Manufacturers' Association a demand for 15 percent increase in wages. It is claimed by the officials of this league that they have a greater percentage of workers in their organization than any other craft employed in the Metal Trades. It is rumored that it is the intention of the organization to present a similar demand on all employers of their craft.

The financial statement of the International Association of

Machinists shows that during 1904, $241,913.90 was distributed for strike benefits, and $38,199.96 for other disbursements, making a total of $280,113.86 as having been contributed by the machinists of this country.

### LABOR NOTES.

The Youngstown, O., molders have not as yet accepted the proposition offered them by the manufacturers, but have given the usual 30 days' notice that when the present agreement expired at the end of June they will demand changes in the labor union. An advance of 10½ per cent is offered to all molders and coremakers providing the present agreement is extended another year.

The Manufacturers' Association of Pittsburg has granted the iron molders of that district a voluntary increase of 10 per cent.

The International Association of Bridge and Structural Iron Workers has made official announcement of its withdrawal from the Structural Building Trades Alliance, which recently held its national convention at Buffalo. The withdrawal is the direct result of the resignation of President Buchanan of the Alliance.

President F. J. McGee, of the Iron Molders' Union of Worcester, Mass., is the authority for saying that the cost of the molders' strike for the first few weeks last June was $1,850 per week, but he states now that there are only 84 men idle out of those who went out, and these at present cost the union about $500 per week.

Business Agent John O'Neil, of the Iron Molders' Union, of Columbus, O., is recovering from the effects of an accident at Canton, O., where he was run down by a horse and seriously injured.

The strike of boilermakers against the Franklin Boiler Works Co., Troy, N. Y., for an open shop agreement, is still in effect.

William Patton, the Cincinnati striking iron molder, who pleaded guilty to manslaughter after killing Samuel Weakley, a strike breaker, during the labor troubles last summer, was given the extreme penalty May 22, when Judge Samuel Smith sentenced him to the penitentiary for twenty years.

The machinists in the employ of the Canada Foundry Co., are on strike to abolish the premium system established in the shops of the company. The men on strike are members of the Amalgamated Society of Engineers and the International Association of Machinists, and these two unions are united in an effort to force their demands.

Judge McPherson, of Des Moines, Ia., has issued an injunction on application of the American Can Co., of Davenport, against the striking employes of the company. The injunction was directed against the members of the United Metal Workers' Union No. 101. They have already been fined for disturbing the peace.

The financial statement of the International Association of Machinists shows that during 1904 $241,913.90 was paid out on account of strikes, and $38,199.96 for other disbursements, a total of $280,113.86.

At a meeting of the St. Louis Metal Trades Association held May 23rd, 1905, the St. Louis Metal Trades Association was merged into the national under the name of the St. Louis Branch of the National Metal Trades Association, by a vote of 473 against 4. The detail work of the individual members filing applications for membership in the national is almost completed, more than 90 percent of the strength of the St. Louis organization having already signed.

A meeting of the New York and New Jersey Foundrymen's Association was held May 22, to consider the demands recently made by the Brotherhood of Foundry Employes for an increase in wages; the employment of only Brotherhood members as cupola tenders and foundry helpers and laborers, and the privilege of the walking delegate to visit the shops to transact union business. At this meeting these demands were fully discussed and it was decided to refuse to grant them.

## NEVER BRIGHTER

### Was the Outlook for Shipbuilding on the Great Lakes.

The outlook for shipbuilding on the great lakes was never brighter. With all the big shipyards still working on contracts taken last season, contracts have already been signed for the construction of sixteen large lake freighters to be delivered at the opening of navigation, 1906. Of these the American Shipbuilding Co., has eleven, the Great Lakes Engineering Works, Detroit, four and the Craig Shipbuilding Co., Toledo, one. The American Shipbuilding Co., will also build a car ferry for the Marquette & Bessemer Dock & Navigation Co.

One striking feature in the new work under contract is that the smallest freighter ordered to date for delivery next spring is 500 feet long. The car boat, of course, is an exception, being only 350 feet long. Eight large sized freighters are now building and will be launched in time to go into commission this season, aside from the sixteen mentioned as under contract for 1906 delivery and thirteen freighters were launched between March 11 and June 1.

In addition to the vast amount of new construction, practically all the shipyards on the lakes have been kept busy on repair work incident to the early start this year and their ice bucking experience in St. Mary's river, Straits of Mackinac and Lake Superior.

### Commerce at the Soo.

The report of General Superintendent Joseph Ripley, at St. Mary's Falls canal, prepared under direction of Lieut. Col. Chas. E. L. B. Davis, Corps of Engineers, U. S .A., shows that during May, 1905, 4,332,736 tons of iron ore passed through the American and Canadian locks at Sault Ste Marie. Of this amount, 3,619,776 passed through the American locks and 712,960 through the Canadian locks. The total for the season of 1905, to June 1, through both canals was 5,139,574 tons as compared with 4,625 for 1904, 4,021,205 for 1903 and 4,458,312 for 1902. The low showing for 1904 is due to the late opening of navigation owing to the strike of the Masters' & Pilots' Association, when general operations did not begin until June 15.

The plant of the Parkhurst Compound Steam Boiler Co., Oswego, N. Y., was not sold at public auction May 27, as it did not seem to the referee in bankruptcy that a sufficient bid was made for the property at the time and the sale was adjourned to June 30. Norman S. Bentley is trustee for the company.

The Manning, Maxwell & Moore Co., with principal offices at Paterson, N. J., has been incorporated with an authorized capital stock of $5,000,000 and will continue to manufacture and sell all kinds of machinery. The incorporators are John L. Griggs and Donald Holmes, of Paterson, and Colby M. Chester Jr., of Greenwich, Conn.

The Niles, O., furnace of the Carnegie Steel Co. has been blown out. It has been in operation since last December. Furnace No. 4 of the Ohio works, Youngstown, O., has been blown in after a brief idleness and No. 3 of this group is expected to resume this week.

Extensive improvements are to be made to the upper and lower Union mills of the Carnegie Steel Co., Youngstown, O. The ten-inch bar mill is being equipped with modern machinery and is being extended 70 ft. and four new Taylor gas producers are being installed.

An accident at the blast furnace of the Zenith Furnace Co., Duluth, Minn., May 27, caused about $7,000 damage. The stack was blown out and it will take about a month to repair the damage.

# NEWS FROM MANY INDUSTRIES.

**New Buyers :—**

The Mutual Mfg. Association, Sidney, O., has been incorporated with a capital stock of $200,000. The incorporators are: W. O. Allen, C. Swing, Carl Bulle, C. E. Roll and F. Athey. The company will conduct business at the old Anderson wheel works.

The United Drop Forging Co., Springfield, Mass., has been incorported with a capital stock of $60,000. The promotors are: Paul J. Norton, L. H. Richards, H. C. Castle.

The Frontier Engineering Co., Lockport, N. Y., has increased its capital stock from $250,000 to $300,000.

The American Tool Co., Louisville, Ky., has been incorporated with a capital stock of $50,000. The incorporators are: J. D. Augustus, J. V. Norman and J. A. Stewart. The company will manufacture and handle machinery and utensils.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until June 20 for machinery for the Portsmouth, Boston, New York and Norfolk navy yards, as follows: Schedule 272, rotary converters, locomotive steam piping system; schedule 273, foundry crane, drills, grinders, lathes, milling machines, planers, drill press, pipe threading machine, saws, saw sharpener, saw bench, shears, shapers, cutting off machine, motor drive outfits, plug machine, bolt pointing machine, oil separator, sanding machine, wood trimmers, stove pipe crimper, grindstones, pump slotting machine, beveling machine; schedule 274, punch.

The Consolidated Rail & Steel Co., St. Louis, Mo., has been incorporated by Barney Grossberg, Samuel Grossberg, Abe Gallant and Charles Lewis Gallant. The capital stock is $12,000, one-half paid.

The Norton Machinery Co., Cincinnati, O., has been incorporated by W. D. Norton, L. M. Norton, C. E. Woodworth, C. C. Pinney, E. F. Thompson and David Davis. The capital stock is $2,500.

The Penn Shovel Mfg., Warren, O., has been incorporated with $10,000 capital stock. The incorporators are: S. W. Park, George Bunting, Daniel Somers, C. F. Clapp and Jules Valutrot. This company is a temporary one formed to operate the plant of the Penn Shovel Co. until such time as that company can be dissolved, when it will probably turn in its charter and apply for the former name.

The Canadian Shovel & Tool Co., Ltd., Hamilton, Ont., Canada, has been incorporated to manufacture and deal in shovels, spades, railway tools, etc. The capital stock is $150,000.

The Buena Vista Foundry Co., Clifton Forge, Va., has been incorporated to manufacture and repair machinery of all kinds, working generally in iron, steel, brass and other metals. The incorporators are: W. W. Taylor, president and director, Clifton Forge, Va.; R. L. Parrish, director, Covington, Va.; J. L. Blizzard, secretary and treasurer, Clifton Forge, Va. The maximum capital stock is $25,000; minimum, $5,000.

The American Keyless Lock Co., San Antonio, Texas, has been incorporated to manufacture and sell locks and hardware. The incorporators are: O. Katzenberger, Adolph Driess, Otto Kochler, E. H. Elmdorf and R. L. Ball. The capital stock is $50,000.

The Hennepin Bridge Co., Minneapolis, Minn., has been incorporated by Lawrence H. Johnson, Frank H. Howe and William H. Roberts. The capital stock is $100,000.

The Kennett Foundry & Machine Co., Kennett Square, Pa., has been incorporated with a capital stock of $50,000.

The Washington Coal & Coke Co., Madisonville, Ky., has been incorporated for the purpose of buying and selling mineral lands.

The American Marine & Locomotive Equipment Co., New York City, has been incorporated with a capital stock of $1,000,000 to manufacture locomotives and marine equipment. The incorporators are: Charles O. Harms, Summit, N. J.; Monroe N. Lowenthal, 125 East 114th street, New York; Felix Muehlenthal, 1420 Fifth avenue, New York; Abraham Lindheim, 1012 Lexington avenue, New York; Samson Lowenthal, 111 East 126 street, New York.

The Atlas Cement Machinery Co., has been incorporated with $10,000 capital stock to manufacture machinery. The incorporators are: Charles L. Aird, Jackson, Mich.; Charles E. Shore, A. T. Bradley, Alfred J. Shore, Rochester, N. Y.

The Hanson-Brittingham Machinery Co., has been incorporated by Frank Hanson, Dallas, Texas; T. C. Brittingham and J. T. Whitaker. The capital stock is $6,000.

The E. Lane Smokeless Furnace & Boiler Co., St. Louis, Mo., has been incorporated by Edward Lane, Maurice J. Lane, Mary Lane and Wm. P. Darcy. The capital stock is $50,000.

The Shelby Machine Co., Shelby, O., has been incorporated by Edwin Mansfield, H. L. White, A. C. Moore, H. Brubaker and James A. Brubaker with $20,000, capital stock.

The Birmingham Frog & Crossing Works, North Birmingham, Ala., has been incorporated with $60,000 capital stock. The company proposes to manufacture all sorts of railroad iron, frogs, switches, etc. The incorporators are: Kilby Locomotive & Machine Works, W. W. Stringfellow and Minnie P. Scott, all of Anniston. W. W. Stringfellow is president and E. M. Kilby is treasurer and general manager.

The Continental Steel Co., Cleveland, O., has been incorporated by Joseph B. Turner, J. C. Wade, H. Broilling, R. J. Miller and George W. Ross with $25,000 capital stock.

The Combined Tool Co., Leominster, Mass., has been incorporated with a capital stock of $25,000. The president is E. F. Underhill and the treasurer Ben A. Hapgood.

The Elizabeth Iron Works, Norfolk, Va., although plans for re-building have not yet been completed, is in the market for punch and shears, steam hammer, radial drill and small pneumatic tools, traveling crane, and open slide planer and boring mill. W. P. Pettit is treasurer of the company.

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**Fires :—**

Fire damaged the foundry of Guest & Co., Pottstown, Pa., May 25. The loss is about $1,500.

The Ford & Donnely factory and machine works, Kokomo, Ind., were destroyed by fire May 27. The flames started in the boiler room and spread to other parts of the plant. The loss will amount to $10,000, covered by insurance.

Fire at the Davis-Hansen Pump Works, Oshkosh, Wis., destroyed a one story frame building used for storing coal and a portion of the foundry building. The origin of the blaze is unknown, but it is presumed that sparks from a passing locomotive started the fire.

Fire damaged the foundry plant of C. A. Potts & Co., Indianapolis, Ind. The loss is estimated at between $3,000 and $4,000.

The Trenton (Mich.) water works plant and electric lighting station were totally destroyed by fire May 27. Both buildings were reduced to ruins and the loss is $30,000 to $35,000 with $5,000 insurance. The structures were of brick and were erected only about two years ago.

Fire in the machine shop of the Truxall-Painter Machinery Co., Chattanooga, Tenn., caused damage of $4,000. It was insured in the Phenix of Brooklyn for $2,000 and Commercial Union for $750.

Fire started in the top floor of the repair shops of the Buffalo, Rochester & Pittsburg Railway at Lincoln Park, Rochester, N. Y., May 30. It was confined to the repair shop, which is a brick building 80 by 120 ft. The loss on the building is $5,000 and on the contents, $15,000 to $20,000.

**New Construction :—**

M. B. Tower and H. A. Shaw, Chattanooga, Tenn., are erecting a large machine plant which will cost about $10,000. The firm will conduct a machine shop and manufacture machine supplies of various kinds, and the plant will be equipped with machinery of the latest design.

Work on the new molding room of the Malleable Iron Works, Beaver Dam, Wis., is being rushed to completion. The new addition will be 44 x 200 ft. and adjoins the present plant of the company.

Contractor F. King, of Duluth, who is building a new transfer table for the Duluth, Missabe & Northern railway, has started work on the foundations for the machine and car shops for the same road. When completed, the shops, it is claimed, will be finest in that part of the country. They will be built of concrete, brick, stone and steel.

Application has been made by the Union Machine Co., Nashville, Tenn., for the amendment of the charter of the corporation and change of name to the Union Machine & Supply Co., and increase of capital stock from $25,000 to $60,000. The present building will be enlarged to meet the demands of the new concern. President T. H. Warren, of the Union Machine Co., will still be at the head of the company. W. H. Gordon, of Keith, Simmons & Co., will be secretary and treasurer, and George Hare, also of Keith, Simmons & Co., will be the general manager. The above officers and W. C. Nimmo, Southern agent of the Atlas Engine Co., and E. L. Gee, of Keith, Simmons & Co., will constitute the board of directors. Phillip C. Prousnitzer, of the mill supply department of Keith, Simmons & Co., will be one of the road men of the new concern.

The Brown & Sharpe Mfg. Co., Providence, R. I., is to make extensive additions to its plant. New space for general manufacturing will be provided and the foundry building will be extended to practically double the company's capacity for making gray iron castings. The growth of the business makes the extensions necessary.

Beckwith & Pike have been awarded the contract for the construction of the $32,000 plant for the Alden Sampson automobile factories at Pittsfield, Mass. The plant will consist of a machine shop, blacksmith shop, office and garage building and is to be ready for occupancy Sept. 1.

Benjamin Atha & Co., Chapel and Lister avenues, Newark, N. J., will build a new factory and machine shop, two stories, 72 x 100, of brick, and to cost $13,500. Work will start July 1.

The Field-Brundage Co., manufacturer of gasoline engines. Jackson, Mich., is constructing a new fireproof building of cement steel, and will move from its present site as soon as the new structure is completed.

The Buckeye Engine & Foundry Co., Rockdale, Ill., has outgrown its present building, and will construct additions for a new office and pattern shop and additional machine shop space.

The Art Metal Construction Co., Jamestown, N. Y., has asked for bids for the enlargement of its plant by the erection of two buildings; one 80 x 220 ft., four-stories high and one 65 x 200 ft., two-stories, and other small buildings. Arthur C. Wade is president of the company.

The contract for excavations and foundations of the new Gray & Dudley foundry, Nashville, Tenn., has been let to Foster & Creighton, and work will be started at once. The building will be 200 x 110 ft., and will be completed about August 1.

George Cook, of Minneapolis, has secured the contract for the extensive new plant of the Twin City Rapid Transit Co., of St. Paul, Minn. Nine buildings will be erected, all of which will be of reinforced concrete construction and will include a woodworking shop, machine shop, blacksmith shop, structural shop and several others.

The Massey-Harris Co., Ltd., Toronto, Can., is making extensive additions to its present plant, and is building a structure, 400 x 125 ft., five-stories, of brick, slow burning construction, with two heavy cross walls dividing it into three departments. At the first of the present year the Massey-Harris Co. purchased the plant of the Kemp Manure Spreader Co., Stratford, Ont., and this company may move to Toronto, although the matter has not been definitely decided.

The Craftsman Yacht & Power Co., Mobile, Ala., has just completed its new building, 125 x 70 ft., on the river front at Mobile.

The Vulcan Iron Works Co., Toledo, O., has definitely decided to erect a new plant very much larger than the one it now occupies and install the most modern equipment. Details have not as yet been determined.

The Temple Ornamental and Structural Iron Works, Temple, Pa., on plans of George Gerhard, architect, of Reading, are preparing for the erection of a plant at Temple, Pa. The company proposes to erect at present a shop for ornamental and light structural work, and later, as soon as convenient, will erect a steel structural shop. The company expects to have the new plant in operation about July 1 and be equipped to get work out at low prices consistent with good workmanship. For equipment the company is putting in a 35 h. p. New Era gasoline engine, a Chicago pneumatic air compressor plant, with all the necessary appliances, air drills, riveting hammers and chippers, combination punches and shears suitable for cutting and shearing rounds, squares, flats, plates, angles and tees; drill presses, radial drills, miller mechanics, lathes, shapers and cold saws—in fact, everything to equip the plant in an up-to-date manner and facilitate the quick handling of work. Alfred J. Genner, for four years superintendent of the Wm. F. Remppis Co., of Reading, Pa., is manager of the company.

The Renfroe Replacer Co., Birmingham, Ala., recently incorporated, expects to erect in the near future a foundry, 80 x 300 ft., for the purpose of casting in steel the Renfroe car replacer, which has met with great success in the market. The officers are John Sweet, president; J. L. Renfroe, vice president; J. A. W. Smith, secretary and treasurer, and E. J. McCrossin, general manager.

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**General Industrial Notes:—**

The William A. Harris Steam Engine Co., Providence, R. I., has purchased the property at Central Falls, R. I., formerly occupied by the New England Electrolytic Copper Co., and owned by the New England Electric Rivet Co., and will build shops and a foundry on the site.

Orders for machine shop, pattern shop and foundry equipment will be placed about June 25 by the Moffat Machinery Co., Charlotte, N. C., for equipping its new plant. The new shops will cover a floor area of about 25,000 sq. ft., and the main building will be 60 x 250 ft. on either side of which will be erected the foundry and blacksmiths' shops.

The Isthmian Canal Commission has awarded the contract for a 10-ton locomotive crane to the Industrial Works, Bay City, Mich., at its bid of $6,995, and to the American Hoist & Derrick Co., St. Paul, Minn., a 20-ton crane, at its bid of $6,600.

The Van Buren, Heck & Marvin Co., Findlay, Ohio, is building a ditching machine capable of digging a ditch 8 feet deep and 54 inches wide. It will be 30 ft. high and will weigh 40 tons and will be used in building a 90-mile drainage ditch in California.

The Board of Public Service of Niles, Ohio, is planning to purchase a large engine for its lighting station and is considering a proposition for a steam turbine made by the Warren Electrical Co., Sandusky, which has recently embarked in this line of work.

Supt. Hurd, of the McKenna mills at Joliet, Ill., has announced that barring accidents there will be no further shut downs for the remainder of the year.

The Reeves Engine Co., has moved its Chicago office from 1612 Monadnock building to 805 Ellsworth building, 335 Dearborn street.

# Smoke and Its Abatement.*

BY CHAS. H. BENJAMIN, CLEVELAND.

The subject of this paper is one which was suggested by the secretary of this society during the past year, and is, or ought to be, of general interest at the present time. The smoke nuisance has long been one of the bugbears of living in the Middle West and is now rapidly becoming an important factor in the East. It is so much easier to keep this nuisance out than to get rid of it when once in, that the residents of cities on the Atlantic seaboard ought to be alive to the situation.

The fact might as well be recognized at once that the supply of so-called smokeless fuels, anthracite coal, petroleum, natural gas, etc., is limited and will not begin to satisfy the demand. The supply of bituminous coal on the other hand is practically unlimited, and it is doubtless the fuel of the future. The abundance of it, its cheapness and the readiness with which it burns, even with a poor draft, combine to make it a most desirable fuel. This granted, the further fact remains that it will be burned to a larger and larger extent in the East as well as in the West and that no legislation can prevent this. Just as anthracite coal becomes more scarce and its price increases, just so surely will its place be taken by the cheaper and more abundant fuel. The problem for our engineers and lawmakers is not how to prevent the burning of soft coal, but how to burn it in such a way that the combustion shall not be a public nuisance. Unfortunately this, our best fuel, is at the same time our dirtiest fuel both in the handling and in the burning. The smoke from most other fuels, while not suitable for the lungs of human beings, is, if carried to a sufficient height by a chimney, comparatively inoffensive, since it does not return to earth.

### Abating Smoke from Bituminous Coal.

The present discussion will then be confined to the problem of abating the smoke from bituminous coal. The word abatement is chosen with a reason and the terms smoke prevention and smoke burning are discarded. It is not practicable to prevent the evil entirely, but only to mitigate it in a degree. Smoke burning on the other hand is an impossibility under the conditions which usually present themselves.

During my somewhat strenuous experience as city smoke official I encountered two extreme types of unbelievers. One was the private citizen who did not believe that manufacturers had any rights in the premises and who clamored for instant prosecution. The other was the manufacturer who considered that smoke was an index of prosperity and regarded any criticism or interference as malicious persecution. Between these two extremes were all sorts and conditions of men, some belligerent, some indifferent, some interested, but nearly all destitute of any appreciation of the true nature of smoke or the means of its abatement. I would not jeopardize my standing in this society by insinuating that there are any such present.

It will be well at the outset to state three propositions: *a.* The smoke from bituminous coal is a nuisance, especially in large cities. *b.* Such smoke can in the majority of cases be easily abated. *c.* Such abatement can be made a source of profit to the owner of the plant as well as to the community. There need be no difficulty in establishing these propositions by precept and by example.

Objectionable black smoke is due to the presence of hydrocarbons in the fuel and is produced as follows: The hydrogen and carbon compounds in the coal are driven off as gas by the heat at a comparatively low temperature, and may escape unburned. In this condition they would not constitute smoke in the common sense of the term. If heated to a sufficiently high temperature in the presence of air they burn with a yellow flame. If the air supply is insufficient, is poorly mixed with gas, or if the temperature is lowered in any way, combustion is checked and carbon is deposited in the form of soot or carried off with the gas as smoke.

I cannot illustrate this better than by quoting from a paper read last year before the American Association for the Advancement of Science:

> The combustion of hydrocarbons seems to be always complete at first. If one watches the slow burning of a lump of cannel in the open grate he will see a whitish or yellowish vapor expelled from the coal by the gradual heat of the fire. This is the carbon and hydrogen combined which is distilled by the heat and leaves behind the free carbon as coke. While the escape of this vapor unburned represents a distinct loss of heat, the vapor is not smoke as we understand it. It does not deposit soot and will not stain or disfigure surfaces in its path.
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> As the heat increases, and air is supplied, the vapor ignites and burns with a yellow flame showing the presence of solid particles. If the temperature remains high and the air supply continues, the combustion is complete and the colorless carbon dioxide and water vapor pass up the chimney. If, however, the burning gas becomes chilled by contact with the relatively cool bricks of the chimney back or if insufficient air is supplied, the yellow flame becomes red and dingy, while particles of finely divided carbon are deposited on the adjacent surfaces or whirled away up the chimney.
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> The ordinary coal oil lamp is one of the best illustrations of perfect combustion and consequent smoke prevention. The heated gases rising in the chimney produce a draft and fresh air is continually drawn in at the bottom through the hot gauze which warms and divides it so as to insure thorough mixing with the gases from the burning oil. Turn up the wick and the flame becomes smoky—too much hydrocarbon for the air supply. Raise the chimney slightly from the bottom and again there is smoke—too much air at too low a temperature which chills the flame. Insert a cool metal rod into the chimney and soot is deposited on it—chilling of the flame again and disengagement of the carbon, while the hydrogen continues to burn.
>
> And thus we may learn of the three requisites for good combustion; enough air, a sustained high temperature and a thorough mixing of the gases. The last two are so important that it is entirely possible to have an excessive supply of air and dense black smoke at the same time.

It is difficult to form any estimate of the amount of damage inflicted by soft coal smoke in a city like Pittsburg or Cleveland, but it probably amounts to hundreds of thousands of dollars annually.

The deterioration of dry goods, draperies and delicate fabrics on the shelves and counters and in the show windows is a direct tax on the buyer. In the book trade the situation is perhaps worse. I remember seeing in a display window in Chicago an assortment of valuable books, most of them open to view and all of them so streaked and spotted with soot as to render them unsalable at any decent price. Our libraries, public and private, are suffering day by day, and our art collections grow more and more dingy. Cleveland can produce an old master "while you wait."

One of the largest items of annual expense in the city hotel or club house is that of cleaning draperies, rugs and furnishings, and of redecorating walls and ceilings. A great part of this is directly chargeable to coal smoke.

The presence of more or less sulphur in the soot renders it a corrosive as well as a discoloring agent and greatly increases the damage done. Trees and shrubs suffer in such an atmosphere and are frequently killed outright by the presence of sulphurous smoke. The effect on human beings has not been definitely determined, but the deposition of soot on the delicate tissues of the respiratory organs can hardly be beneficial.

### Smoke is a Nuisance.

In law a nuisance is "such a use of property or such a course of conduct as, irrespective of actual trespass against others or of malicious or actual criminal intent, transgresses the just restrictions upon use or conduct which the proximity of other persons or property in civilized communities imposes upon what would otherwise be rightful freedom." (Century Dictionary.) Smoke is then a nuisance and can be prohibited by state or municipal enactment as the case may be. I have no more right to deluge my neighbor's premises with soot than I have to empty my garbage can over the fence line. The abatement of smoke is in principle extremely simple, but presents some difficulties in the practical application. Only three conditions are necessary for complete combustion, the proper temperature, the proper air supply, a thorough mixing of the air and the hydrocarbons. The last condition is as important as any and is one too often neglected. It is this condition which gives the gas or liquid hydrocarbon an advantage over the solid, since the atomizing of the former by the steam or air jet insures the most intimate contact between the air and the fuel.

*Read at the Scranton meeting (June, 1905) of the American Society of Mechanical Engineers.

The use of pulverized coal in combination with air or steam is a close approximation to the above, and, when properly managed, gives good combustion, no smoke and a high efficiency. The cost of pulverizing and the impracticability of storing pulverized fuel have so far hindered the more general adoption of this process, except for metallurgical work.

When coal in the ordinary form is used as a fuel, smoke abatement involves some means of varying the coal supply and the air supply according to the demands made upon the boiler. When ordinary hand firing is resorted to, the great irregularity of the coal supply will cause poor combustion and smoke unless the air supply is varied to correspond. Steam jets are frequently employed under these circumstances, and, if properly put in, will improve the combustion by drawing in additional air over the grate and mixing it with the products of combustion in front of the bridge wall. The steam jet should be semi-automatic, the steam and air being turned on by the opening of the fire door and gradually closed off by a dash-pot attachment.

**The Best Solution of the Smoke Problem.**

The best solution of the smoke problem, so far, has come from the introduction of mechanical means of handling the coal, which give a uniform feed to the fuel and a corresponding delivery of air for combustion. The use of mechanical stokers has been brought about by the mutual demand for machine handling in large power plants as more economical than human labor, rather than by a philanthropic desire to benefit the community. It has been estimated that one able-bodied man with a shovel and slice-bar can take care of 200 h. p. of boilers. With good mechanical stokers he can handle double, and with complete coal and ash-handling equipment three times this amount.

Stokers may be divided into three principal classes: Inclined, shaking grates—traveling or chain grates—and underfeed stokers. The inclined grate, as exemplified in the Wilkinson, Brightman and Roney stokers, has a hopper in front and slopes down and back, having a clinker grate just in front of the bridge wall, while the double incline, as in the Murphy and Detroit stokers, has a magazine on either side and slopes in two planes parallel to the axis of the boiler, meeting in a clinker grate at the bottom. The principle of action is practically the same and involves the slow coking of the coal on a dead plate, the pushing forward on the top of the incline and the gradual descent, impelled by oscillation of the grate bars, until the combustion has left nothing but ash and clinker at the bottom. Air is usually admitted both below and above the grate, and the hydrocarbons which are distilled at the top of the grates pass through the intense heat of the burning coke on their way to the bridge wall and are completely burned. The double incline usually has a revolving clinker bar which disposes of some of the ash automatically, but as a rule both forms need considerable cleaning. When used with a fuel which does not cake or clinker too much and when not crowded too hard these stokers are economical and reduce the smoke considerably. If, however, it becomes necessary to slice and poke the fire on account of caking coal or overcrowded boilers, unburned masses of coal are rolled to the bottom and holes are made in the fire through which cold air rushes. Both of these circumstances make for poor combustion and a smoky fire. As a rule firemen poke the fire on stokers too much, doing more harm than good.

I have seen inclined grate stokers, carrying a heavy fire and developing much more than the rated capacity of the boiler with very little slicing and hardly a trace of smoke. Cleaning is usually a source of black smoke for a few minutes, but this is mostly unnecessary if the fireman understands his business and gets his fire ready for cleaning beforehand. I think the middle door in the Murphy furnace is sometimes a disadvantage, as it tempts the fireman to meddle with the fire when he had much better leave it alone.

The traveling or chain grate is rapidly coming into favor as a means of stoking automatically. It consists, as in the Babcock & Wilcox and Green stokers, of an endless horizontal chain running on sprocket wheels and carrying the coal back under the boiler, finally dumping the refuse over the back and into the ash-pit. The distilling process and the gradual burning of the coke are much the same as in the stokers just described. In order to prevent waste through the grates the latter are usually quite close, and it becomes necessary to use more draft than with ordinary grates. A damper is used underneath the grate to prevent an excess of air from passing up behind the grate. Some tests recently made by a large corporation which uses a considerable number of the chain grates showed an evaporation of only 5.7 lb. water per pound of coal. An examination disclosed the fact that a large excess of air was passing through the comparatively bare grate at the rear end. The introduction of a damper to regulate this brought about a great improvement. With the same fuel and same conditions as before an evaporation of 8 lb. water per pound of coal was obtained. Intending users of chain grates would do well to bear this in mind. From observations covering a period of several years I have come to the conclusion that this type of grate is the best one yet devised for abating smoke. The fact that it is horizontal, so that unburned coal cannot run to the rear end, and the further fact that it is self-cleaning and need not be disturbed by the slice-bar, make it an almost ideal furnace in this respect. If run by an intelligent fireman who understands adapting the depth and travel of the fire to the work to be done, it will also be a very economical furnace.

The underfeed stokers operate on an entirely different principle, the coal being fed in underneath the grate and forced up through a rectangular opening in the center. A forced blast is used and the air for combustion is blown up through the coal, the tuyeres being on either side of the rectangular opening just mentioned. By this arrangement the fresh coal is always underneath and the distilled gases are obliged to pass through an incandescent mass of fuel in company with the air. With a proper pressure of blast perfect combustion is thus almost unavoidable. The ash and clinker are now at the top of the fuel, which forms a gradually rising mound in the center and pushes the clinker over to either side, whence it is removed by hooks through doors at the front. The heat generated is such that the ash generally melts and forms a sheet of clinker which can be easily removed without disturbing the fire.

In the American stoker the coal is forced under the grate and up by a revolving screw, somewhat similar in shape to the ordinary gimlet pointed lag screw. In the Jones underfeed stoker a plunger driven by steam operates to feed the coal. This plunger can be arranged to start and stop by hand or to run automatically. My experience has shown the underfeed stoker to be economical in operation and practically smokeless.

A criticism frequently made in regard to mechanical stokers is that they will not respond quickly to sudden changes in the load, that it is difficult to keep a uniform steam pressure under such circumstances, and that for this reason they are not economical. There is some truth in this. It is easy to conceive of circumstances, especially in electric plants, under which it would be difficult to maintain a uniform steam pressure with either the oscillating or the traveling grate. For regular fluctuation of load, as in electric lighting or railway power houses, the obvious remedy is the introduction of storage batteries and the provision for ample boiler reserve.

Minor fluctuations can be taken care of by the fireman unless they become too numerous or too violent. In the latter case the underfeed stoker with the plunger feed comes the nearest to satisfying the demand. With the power of instantly regulating the motion of the plunger and the pressure of the blast, it is thus possible to meet emergencies of this kind more promptly than by hand firing.

With the complaint sometimes made that stokers cannot be forced I have no sympathy. With an ordinary inclined grate

stoker under a horizontal tubular boiler I have forced a boiler to 75 percent above its rating with practically no smoke and with an evaporation of over 8 lb. water per pound of bituminous slack. It all depends upon the draft and upon the intelligence of the fireman. Probably, however, none of us believe in forcing a boiler to this extent; it is bad for the boiler, bad for the stoker and bad for the coal pile.

**The Economy of Smoke Abatement.**

The economy resulting from the abatement of smoke is naturally a potent argument in its favor. This phase of the subject has, however, but little to do with the ethics of the question. Once prove that it is practicable to abate smoke and the community has a right to insist on its abatement regardless of economical considerations. It may cost me more to haul away my garbage than to throw it into my neighbor's yard, but that is no argument for my imposing upon my neighbor.

Fortunately this difficulty does not exist in most cases, for it may stated as a general proposition that smoke abatement means economy in fuel consumption. The proof of this statement is extremely simple: fuel economy results from good combustion, good combustion is accompanied by little visible smoke. It must be remembered that the converse is not necessarily true, for a smokeless chimney does not always mean good economy. An excess of air may insure entire oxidation of the combustible matter and at the same time so dilute the chimney gases as to cause serious waste of heat. The problem to be studied by the manufacturer should be how to obtain the most perfect combustion of the particular fuel which he uses and then the smoke question will take care of itself. Let him make frequent analyses of chimney gases, compare different pressures of draft and different dispositions of dampers and he will be repaid for his trouble in more ways than one.

Personally I believe in the automatic stoker as the most economical solution of the problem. In forming this opinion I do not rely upon expert tests for efficiency; there are so many variables entering into the question that it is difficult to make accurate comparisons in this way. As it is entirely possible to improve the efficiency of a furnace ten or fifteen percent by intelligent hand firing, there is much difficulty in determining the actual saving effected by a stoker. During a competitive test between the hand-fired furnace and the stoker the conditions are often entirely different from those obtaining in every-day use, and these changed conditions are usually more to the advantage of the hand firing. By this I mean that good hand firing is the exception rather than the rule, on account of the dirty, disagreeable nature of the work and the low grade of help employed. With the introduction of mechanical handling there is a reduction in the quantity of manual labor and there should be an improvement in its quality. Manufacturers should understand that if they expect to get the benefit of improved machinery they must have men competent to run it to the best advantage.

The surest method of determining the relative economy of the two methods is by comparing the coal bills before and after the change, making due allowance for any variation in the work done. This has been done in a number of instances to my knowledge and the result has always been favorable to the stoker. About a year ago I addressed letters to a number of business men and manufacturers who have installed mechanical stokers of various sorts in factories and office buildings, asking for information as to the value as smoke-abating devices of the particular stokers used, and as to the fuel economy and the cost of repairs.

The replies in every case were favorable to the stoker, both as regards smoke abatement and as regards general efficiency. There are in the city of Cleveland fifteen large office buildings, ranging from eight to sixteen stories in height, which have mechanical stokers in connection with their power and heating plants. It is doubtful if any such building will be erected in Cleveland in the future without an equipment of this sort.

One manager of a 10-story office building writes that he has three 200-h. p. stokers which have been in use for four years burning slack coal, and that the only repairs have been the replacing of brick linings at a total expense for the four years of only $50 per furnace.

The following quotation from a letter written by the manager of a large storage warehouse explains itself: "We installed under our four boilers stokers known as the ———, and they all went into service on March 1, 1903. Our chief object in installing the stokers was to abate the smoke, and this they accomplish to such an extent that our chimneys are practically smokeless, and in addition to this we saved 500 tons of coal for the year. This we think is a fair showing, and thus far we have been put to very little expense in keeping them in repair." An extract from another letter is as follows: "The stokers cost approximately $1,500. The annual saving of fuel is $550. The demand for steam is increased 10 to 15 percent."

Personal letters from well-known business men in Cleveland testify to a saving in fuel varying from 15 to 25 percent. A very conservative letter from the chief engineer of one of the largest power-houses in the city contains some criticisms of faults in the various stokers used, but concludes as follows: "While it is impossible for me to ignore the weaknesses in the above stokers, yet I would certainly recommend the use of either of these stokers over hand-firing in a plant of any size using bituminous coal." The business policy of some of the largest corporations forbids letters of commendation for any mechanical device whatsoever, but I am in position to know that exhaustive tests covering a period of months have shown the economy of the new way in a most satisfactory manner. This is further evidenced by the fact that these "soulless corporations" are changing to the mechanical stoking as rapidly as the pressure of business will allow. One suburb of Cleveland, containing large steel works, has been redeemed in the most remarkable manner by the introduction of automatic stokers, so that there is now a place for human beings to live, where formerly all was soot and blackness. The president of a manufacturing company using four stokers reports that he is not only paying from 50 to 75 cents less per ton for his fuel, but is burning six tons less per day than formerly, and at the same time getting better satisfaction in the maintaining of a uniform steam pressure.

It is undoubtedly true that the agents of smoke-abating devices of all sorts have been extravagant in their claims and that they have damaged their own business by such claims, but this is a mistake not confined to the furnace business.

A conservative claim of from 10 to 20 percent saving, depending upon how smoky the furnace has been, can usually be substantiated by a comparison of the coal bills before and after introducing stokers, without resorting to expert tests. I have known so simple a thing as an automatic steam and air jet to pay from 50 to 100 percent annually on the original investment, as determined by the coal bills.

**Expert Testimony on Stoking.**

For the benefit of those who rely largely upon expert tests for their opinions, I introduce a summary of several such tests which have come under my personal observation. See table.

Tests 1 and 2 show the improvement made by more careful handling of the stokers, while 2 and 3 illustrate the advantage of overloading rather than underloading the plant. In test 2 only twelve boilers were used and in test 3 the number was increased to fifteen, the load being nearly the same. The poor showing in test 1 was due principally to waste of coal in the ash. Tests 5 and 6 show the improved results from stokers as compared with hand firing under a heavy overload, while Nos. 7 and 8 give the results of similar tests on Scotch boilers. No. 9 was an acceptance test for a city plant, conducted by trustworthy and experienced engineers. No. 10 is introduced to show how not to do it. Not only is the ash high, showing poor

judgment in running the stoker, but actual measurement proved the air supply to be excessive, about 350 cu. ft. per lb. of coal burned. With induced draft, such as was used in this test, it should be possible to get along with from 200 to 250 cu. ft. of air per pound of coal. Tests 11 and 12 show the possibility of carrying an overload with a chain grate, using a poor quality of coal and getting better results than could be obtained with a better quality of coal hand fired.

| No. | Kind of Boiler. | Kind of Stoker. | Boiler H. P. Rated | Boiler H. P. Developed | Kind of Coal. | Per Cent. of Ash. | Evaporation from and at 212° Per Lb. Dry Coal. | Evaporation from and at 212° Per Lb. Combustible. |
|---|---|---|---|---|---|---|---|---|
| 1 | Return Tubular | Murphy | 1670 | 2241 | Slack | 20.0 | 7.78 | 9.71 |
| 2 | " " | " | 1670 | 2046 | " | 12.9 | 8.88 | 10.14 |
| 3 | " " | " | 2087 | 1923 | " | 13.3 | 8 07 | 9.31 |
| 4 | " " | " | 175 | 232 | " | 19.0 | 9 75 | 12. |
| 5 | " " | Jones Underfeed | 100 | 216 | " | 14.6 | 9.07 | 10 62 |
| 6 | " " | Hand Firing | 100 | 193 | " | 13.7 | 6.71 | 7.78 |
| 7 | Scotch | Jones Underfeed | .... | 232 | " | 8.67 | 7.68 | 8.42 |
| 8 | " | Hand Firing | .... | 170 | Run of Mine | 14.31 | 6.86 | 7 99 |
| 9 | B. and W. | Chain Grate | 600 | 852 | Slack | 13.1 | 10.08 | 11 60 |
| 10 | " " " | " " | 100 | 115 | " | 19.4 | 6.39 | 7.94 |
| 11 | Return Tubular | " " | 125 | 179 | " | 17.5 | 10.35 | 12 56 |
| 12 | " " | Hand Firing | 125 | 134 | Run of Mine | 12. | 7.8 | 8.76 |

If I have said little in this paper about means for smoke abatement other than stokers, it is because I believe that the stoker is the best remedy where it can be used, and that it should always be adopted in new power plants. Whenever for any sufficient reason the stoker can not be introduced, there are other devices which will mitigate the smoke nuisance considerably and also save fuel. The steam and air blast has already been mentioned. A recent improvement which promises well is the combination of steam jets at the bridge wall with oil vapor, creating an intense heat at that point and consuming the hydrocarbons as they pass through. The expenditure of oil is comparatively small and considerable economy is said to result. Brick arches and baffle walls have also assisted in maintaining a high temperature and in properly mixing the gases. The use of a reverberatory furnace or outside oven in which the coal and its gases are thoroughly burned before going to the boiler is another satisfactory method of reducing smoke, and may be used as well with as without a stoker.

In short, whatever produces good combustion abates smoke. In apartment houses and stores where the boilers are used for heating only and the steam pressure is low, the use of fuels which are comparatively smokeless is about the only satisfactory solution. If the use of such fuels is supplemented by intelligent and careful firing, the results will be reasonably satisfactory.

### The Firing of Locomotives.

Locomotive engines present an entirely new set of conditions requiring treatment radically different from that accorded to stationary plants. Several mechanical stokers have been designed for use on locomotives, and one of these at least has been fairly successful. The application is still in the experimental stage, however, and it is too early to pronounce upon its future. Most railroad companies have to rely entirely upon the skill of their firemen for abating the smoke nuisance within city limits and some of them have made a great improvement in this respect. Regular and careful observations during the years 1900, 1901, on the railroads entering the city of Cleveland showed a reduction in the average amount of smoke emitted by locomotives of from one-half to two-thirds, as a result of the so-called one-shovel system of firing, without any change in the furnace or equipment. The introduction of brick arches also proved to be a good investment.

I quote herewith the instructions issued by the management of one trunk line entering Cleveland, during the year 1900. These correspond in the main to a set of rules printed in the *Railway Age*, in July, 1899, which were originally adopted by the C. & O. & T. R. R. as a means of reducing the fuel consumption.

Bituminous coal contains a large percentage of hydrocarbons which are nearly all driven off as gas by the heat of the furnace in a few seconds after the coal enters the firebox. Hydrocarbons, when unconsumed, make objectionable black smoke, but when a sufficient quantity of air is mixed with the hydrocarbons, combustion is complete, and no smoke appears.

After firing each shovelful of coal, the door must be left open one or two inches for a few seconds, admitting enough air to produce complete combustion of the gases driven off from the coal. Care must be taken not to leave the door open longer than necessary to consume the gases. Firemen must learn to work with as light a fire as possible.

Before starting, the blower must be put on and a sufficient supply of coal put in the firebox to insure a good, solid fire. After the coal has been put in the door must be left partly open, by placing the latch on the first notch of the catch, so to remain until the smoke entirely disappears, when the door must be closed.

The engineer should so arrange the water supply that the fireman may be able to fire the engine regularly and economically, and this can be done best when the water is supplied to the boiler continuously.

Firemen must pay particular attention to the manner in which the engineer works the injector and handles the engine, in order to regulate the fire accordingly. Care must be taken to have the blower applied and the door partly open when approaching a station at which a stop is to be made, and no smoke must be allowed to show from the stack at such times, or when descending grades.

While the blower is being used, except when approaching a station at which a stop is to be made, care should be taken to keep the door closed as much as possible, more especially when cleaning the fire, as the blower causes the cold air to be drawn into the flues. While lying on the side tracks, both dampers should be closed to save the fire.

Grates should be shaken only when absolutely necessary, as too frequent shaking causes a loss of fuel, by allowing the unconsumed coal to fall into the ashpan, where it ignites and causes the pan to heat and warp. Ashpans should be examined as frequently as stops will permit, and under no circumstances must they be allowed to become filled.

When possible to avoid it, fire-doors must not be left wide open. To leave the door wide open is especially bad when using steam or blower.

### Regulation should be Discreet.

I believe that the municipalities have a right to insist upon the abatement of black smoke by all users of steam boilers, without regard to the purposes for which the steam is used or the means to be adopted for abatement. This because smoke is a public nuisance and because it can be abated without hardship to the owner of the plant. Nevertheless, when the evil is present and has been present for a period of years, it is not good policy to be too radical in the enforcement of the statutes. The law should be definite and stringent and the penalties adequate, but they should be enforced with discretion by officials who have some technical and practical knowledge of smoke abatement. It is absurd to talk of putting this matter into the hands of the police or of the health officer. The official having charge of this work should be a trained engineer, if possible a technically educated man, and he should be entirely above graft in any of its disguises.

Some years ago I was indicating to the municipal committee of a commercial club in a Western city qualifications for a smoke inspector somewhat similar to those just mentioned, when the secretary of the club, turning to his associates, remarked solemnly: "Gentlemen, I do not see but what we will be obliged to get an angel for this position."

As a rule, very little attention should be paid to complaints, since they are usually inspired by prejudice and neighborhood jealousy rather than by any knowledge of the actual conditions. The inspector should be in a position to know the condition and characteristics of each chimney, and these should be determined by systematic observations made by a trained assistant. The observations should be made each five minutes and should cover all the time during which the chimney is visible.

### Summary of Facts and Principles.

To summarize the facts and principles of smoke abatement, I would repeat: Black smoke is a public nuisance and should be regulated by legal means. It is a result of imperfect combustion and can be largely abated by proper methods of stoking. Mechanical stokers offer the best means of accomplishing this result, in medium-sized or large plants. As smoke abatement is a result of better combustion, economy of fuel is the natural and obvious result. An educated and intelligent public sentiment must be the moving and compelling force, without which mechanical devices and legal enactments will both fail. When the public comes to realize its rights in this matter and that it is under no more obligation to submit to this nuisance than it is to endure bad drainage or filthy streets, laws will be enacted and enforced and the people will wonder that they so long submitted to this unreasonable imposition.

## ACCIDENTS DUE TO BLAST FURNACE GAS.

B. H. Thwaite read a paper on the above topic before the Iron and Steel Institute at its last meeting. He carefully analyzed dangerous conditions and the following suggestions have been drawn up by the author, with a view to securing comparative immunity from fatalities due to asphyxiation:

Where practicable, all gas flues and gas pipes should be placed above the ground, and, if possible, above the breathing level.

If the gas flues are underground they should be built of blue bricks set in cement.

Gas flue manholes should be equipped with lids that will secure the maintenance of perfect gas tightness.

All habitable buildings should be thoroughly well ventilated. The ground surface below the building should be covered with a layer of cement concrete, and an open air space should be formed between the cement surface and the flooring boards of the building.

Forced ventilation should be the principle adopted for all occupied buildings in iron and steel works. An air-supply tapped from the cold blast main may be found useful in this connection.

The gas engine exhaust pipes should terminate at a considerable altitude above the works floor, and part of the air drawn into the air tub of the blowing engine should be supplied from the engine house.

Especial precautions should be taken during flue and stove cleaning periods, and in blowing in furnaces.

Enamel lettered warning notices should be prominently posted throughout the works.

Fines should be imposed on workmen for gas risks carelessly undertaken.

A paid ambulance corps should be established.

During the blow out period of the slag tapping operations the men should be withdrawn from the zone of gas escape.

The time allowed to be occupied in gas producer poking operations for individual men should be limited to three minutes.

The reversing valve pits of gas-fired furnaces should be well ventilated.

Roll call checks of labor employed in gas flue and stove cleaning operations should be established.

If power gas pipes have to be placed underground, they should be placed in grate covered open trenches, and the pipe flanges should be planed.

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The machine shops and storerooms of the Swift Lubricator Works, Elmira, N. Y., were partially destroyed by fire May 22. The boiler and engine rooms also suffered considerable damage. The loss is estimated at $10,000. Before the flames were extinguished a contractor had been engaged to rebuild.

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B. C. Ball and J. K. Kollock of the Willamette Iron & Steel Works, Portland, Ore., went to San Francisco on the maiden voyage of the steam schooner Sea Foam, owned by Beadle Bros. of San Francisco. The Sea Foam was built by the Lindstrom Ship Building Co. of Aberdeen, Wash., and all her machinery was installed by the Willamette Iron & Steel Works, Portland. The Sea Foam made a good trip on a record going down, overhauling quite a number of steam schooners and the Willamette Iron & Steel Works has now secured an order from Beadle Bros. to equip a still larger schooner with triple-expansion engines.

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The Browning Engineering Co., Cleveland, O., have just put out a bulletin devoted to the automatic grab bucket of the Browning square type for digging in coal, ash, cinder, coke, gravel, sand, crush stone or slag or materials of similar character. The parts of the bucket are few and very strong, thus reducing repairs to the minimum.

## THE BELGIAN MEETING OF THE INSTITUTION OF MECHANICAL ENGINEERS.

The summer meeting of the Institution of Mechanical Engineers will be held in Liége, Belgium, and will commence on Monday, June 19. The following Papers have been offered for reading and discussion, and will be read as time permits, but not necessarily in the order here given: "A Superheater applied to a Locomotive on the Belgian State Railways;" by J. B. Flamme, of the Belgian State Railways, Brussels. "The Growth of Large Gas-Engines on the Continent;" by Rodolphe Mathot, of Brussels. "Ferro-Concrete, and some of its most characteristic applications in Belgium;" by Ed. Noaillon, of Chênée, Liége. "Colliery Electric Winding Engines;" by Paul Habets, of Liége. "Strength of Columns;" by Professor W. E. Lilly, of Dublin. "An Investigation to determine the Effects of Steam-Jacketing upon the Efficiency of a Horizontal Compound Steam-Engine;" by A. L. Mellanby, of Manchester.

The meeting is to be held under most enjoyable auspices. The sessions will take place at the University of Liége, the initial reception to the visiting engineers will be held in the Town Hall, the Liége Association of Engineers (René D'Andrimont, secretary, 16 Quai de l'Université) has given its hearty coöperation, and the executive committee of the Liége Exhibition has, through its president, A. Digneffe, granted free admission to the members during their stay from June 19 to 22 inclusive. A number of receptions and excursions to prominent local firms have been planned and invitations to visit the following works have been received: Ateliers de Construction Mécanique de Longdoz, and the Sté. Ame. Liégeoise pour la Construction de Machines of Liége; the Cockerill Co. (Shipyard), Hoboken; Minerva Motors, Ltd.; Light Railway Station; Taillerie Populaire Anversoise; Telephone Works, at Antwerp; Ateliers de Construction H. Bollinckx; De Naeyer (Paper and Boiler) Works, Willebroeck; Electric Station, 11 Rue St. Catherine; Société Anonyme du Canal et des Installations Maritimes; Tramway Central Power Station, at Brussels; Société Anonyme des Ateliers Germain, Monceau sur Sambre; Société Anonyme des Forges, Usines et Fonderies de Haine St. Pierre; Société Anonyme de Marcinelle et Couillet, Couillet; Société Anonyme des Constructions Électriques, at Charleroi; Société Anonyme des Anciens Ateliers de Construction Van den Kerchove, Société Anonyme du Phenix, at Ghent; Belgian State Railways, at Malines; Ateliers de Construction et Chaudronneries B. Lebrun, Nimy, Charbonnages et Ateliers de Construction du Grand Hornu, at Mons.

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The Oakhill Foundry & Machine Co., Oakhill, O., has accepted the proposition of the Guthrie Commercial Club, Guthrie, Okla., to move its plant to that city and make Guthrie its permanent headquarters. A site and a $5,000 cash bonus were given.

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Work of rebuilding, repairing and getting the plant in shape for immediate operation started with the Juanita Steel & Iron Co., Greencastle, Pa., last week. The working force will be increased as soon as men can be secured.

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R. D. Wood & Co., iron founders, Philadelphia, have purchased the Quinn & Sharpless building, and will erect a modern office building over the present structure.

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The New Chattanooga Furnace Co., Chattanooga, Tenn., is making rapid progress on remodeling the old furnaces at Cameron hill and expects to be ready Nov. 1. One of the new features of the plant will be an improved Brown hoisting machine.

## FOREIGN IRON AND STEEL NOTES.

D. & W. Langlands, machine-screw makers, of 8 Hean's Lane, Dundee, Scotland, are retiring from business.

Neilson Brothers & Co., iron and steel merchants, of 53 Bothwell street, Glasgow, Scotland, have been appointed sole agents in Scotland for H. H. Vivian & Co., Ltd., of Birmingham.

A cargo of 1,250 tons of Middlesbrough foundry pig iron is being shipped back from Port-Dundas to Middlesbrough, England, to be put into Connal & Co.'s stores there.

P. A. Postlewaite, mineral and metallurgical chemist, has removed to 2, Union Court, Old Broad street, E. C., London. For some years Mr. Postlewaite was an analyst with Hadfield's Steel Foundry Co., of Sheffield.

On May 12 James Mochrie, one of the managers of the Bonnybridge Foundry (Smith & Wellstood), was entertained by the public of Bonnybridge, Scotland, and the employes of the foundry, on the occasion of his retirement from the foundry and his departure from the district. Mr. Mochrie, who had worked in the foundry for 40 years, was presented with an oak writing-desk and chair.

The Delta Metal Co., Ltd., of London and Birmingham, has built large new works and offices on the riverside at East Greenwich, England. The registered offices of the Delta Metal Co. have been removed from 110 Cannon street, to the new works, where all communications must be addressed.

W. F. Jones, of Larkfields, Smethwick, England, died recently at the age of 82. Mr. Jones was secretary of the Patent Nut & Bolt Co. from its formation until he was appointed liquidator at the time of its reorganization into Guest, Keen & Co., now Guest, Keen & Nettlefolds, Ltd.

Murdoch & Murray, shipbuilders, Port Glasgow, Scotland, are to build four passenger and cargo steamers for service on the river Amazon, and the machinery will be supplied by Glasgow engineers. This is in addition to other two steamers for the same service at present on hand, making a total of six Amazon steamers in the same yard.

Napier & Miller, Ltd., shipbuilders at Yoker, near Glasgow, Scotland, who are the contractors for a number of the London County Council's Thames steamers, are removing to a site further down the banks of the Clyde. About 15 acres of ground in Old Kilpatrick have been acquired for a new shipbuilding yard, fitting-out basin, and a number of workmen's dwelling houses. The most modern electrically-driven plant will be put into this yard.

W. T. Towler & Son, Ltd., has been organized with a capital of £5,000 in 1£ shares, to carry on the business of engineers, boilermakers, contractors for iron and steel work of all kinds, etc. The first directors are W. T. Towler, H. F. Towler, and L. de Beaumont-Klein. Registered office, Plaistow Ironworks, Plaistow, Essex, England.

The Beaufort Works, Ltd., have been registered with a capital of £35,000. This company has adopted agreements with F. N. Powell for the acquisition of certain leasehold lands, buildings, plant, machinery and other property known as the Beaufort Tin-plate Works at Morristown, Glam., Wales, with W. H. Edwards; the Upper Forest and Worcester Steel & Tin-plate Works, Ltd.; Richard Thomas & Co., Ltd.; Baldwins, Ltd., and T. J. Williams and W. H. Edwards, and to carry on the business of spelter manufacturers, steel makers and converters, tin and terne plate makers, galvanized sheet manufacturers and iron-masters.

Enoch Horton, nut and bolt manufacturer, Darlaston, England, died at his home, the Grange, Bescot, Walsall, at the age of 76. When 12 years old he obtained employment at the Darlaston Green Iron Works where he passed through every department. After working as nut and bolt forger he joined his father in the trade at Darlaston. The business was afterwards removed to the old Alma Works. Until three years ago the business was carried on simply as Horton & Son, Ltd., but he remained practically sole proprietor, and obtained office as chairman and managing director.

Henry Gardner, who occupied the chair at the annual dinner of the Royal Metal Trades' Pension Society on May 30, is a managing director of Henry R. Merton & Co., Ltd., metal merchants, of 2 Metal Exchange Buildings, London, E. C., and a director of Williams, Foster & Pascoe Grenfell & Sons, Ltd., copper-smelters, of Swansea and London. He is of Scottish birth and education but has spent most of his business career in London. He is a prominent member of the Metal Exchange, and for some years has filled the chairmanship of the Subscribers' Committee. He is also a director of the Metal Exchange Co., Ltd.

Vickers, Sons & Maxim have just let contracts for further extensions at Barrow, Eng. A new slipway is being constructed on which a ship 1,000 ft. in length can be built. This will be enclosed in a glass-roofed building, with powerful electric traveling cranes over the whole length of the ships when in process of construction. The firm is also constructing a new fitting-up pier in the Buccleuch Dock, Barrow, at which the largest ships can be equipped with engines, boilers, and other appliances. A 150-ton electric crane will be built.

Sir Benjamin Hingley, of Cradley, England, died May 13, from acute heart trouble after a short illness. Sir Benjamin Hingley, born in 1830, was the youngest son of Noah Hingley, whose father, Isaac, was one of the first chainmakers at Cradley. About sixty years ago Noah Hingley decided to supplement his chain trade by making heavy anchors, an industry until then confined to shipping and shipbuilding centres. Noah Hingley, having some of his sons in partnership, decided to manufacture the chain and cable iron used in the works, and about 1852 the Netherton Works were established. Benjamin Hingley began business life under his father in 1845. Later on iron smelting works were established at Old Hill, and the blast furnaces erected were at that time (1855) a model plant. In 1890 N. Hingley & Sons was registered as a limited liability company with Sir Benjamin as chairman. As chairman of the South Staffordshire Ironmasters' Association since 1881, and president of the Midland Iron Trade Wages Board, Sir Benjamin Hingley exercised great influence in preserving the peace between masters and men. Sir Benjamin was president of the Mining Association of Great Britain in 1903, he was a past president of the British Iron Trade Association, and a member of the Council of the Iron and Steel Institute.

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The stockholders of the Kitson Machine Shop, Lowell, Mass., have sold out to the Saco & Pettee syndicate. The business was established by the late Richard Kitson, and it is stated the new owners will continue the present policy of the concern in the manufacture of cotton and special machinery.

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Milliken Bros., Brooklyn, N. Y., were the lowest bidders of 10,000 tons of steel to be used in the construction of 15 bridges for some of the highways of South Brooklyn over the proposed cut and depression of the tracks of the Manhattan Beach division of the Long Island Railroad. The bids were opened by the Brooklyn Grade Crossing Commission.

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The Andrews scraper is now installed at four docks at Cleveland, one at Milwaukee, one at Conneaut, one at Ashtabula and one at Buffalo, in addition to the one at the Detroit furnace dock.

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Contract for making the additions to the plant of the Sullivan Machinery Co., Claremont, N. Y., has been let to F. M. Garthwait, of Chicago, and all other arrangements for the extensions have been completed.

## Gold Medal Louisiana Purchase Exposition

More than enough Cochrane Heaters in present service to equip 1000 H. P. plants at every mile post between New York and San Francisco.

We could not have sold so many "Cochranes" but for the fact that these appliances have been approved, adopted and recommended by the leading consulting and mechanical engineers and the leading steam users, who use them because these heaters give the desired results.

What are the results they were after?

They wanted to utilize their exhaust to the fullest possible extent—they wanted the highest temperature under all conditions, year in and year out—with the heater clean or full of scale—with a limited quantity of steam—or with plenty of it.

They wanted to heat to a higher temperature a given quantity of water with a given quantity of steam than they could with the ordinary type of heaters.

They got these these things by putting in Cochrane Heaters, but they got even more.

These "Cochranes" saved water for them—roughly 15% of the entire quantity used by the boilers—while also giving them the chance to save their live steam drips and other returns without extra tanks or pumps. They also saved the heat that was in this water.

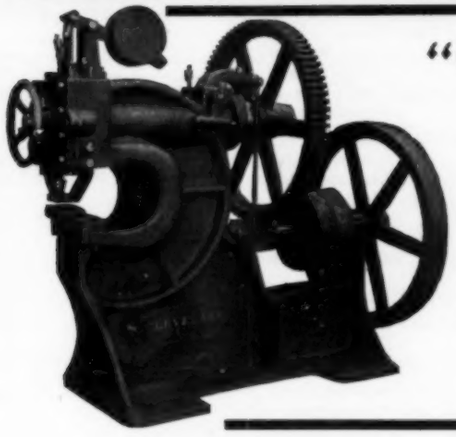
Then without additional expense they got purification—real purification—for no matter how bad their boiler feed supply was these "Cochranes" made it better.

They found out other things—that the design and construction of the Cochrane Heaters gave reliability, freedom from repair, ease of cleaning, etc.

Are not these the feed water heaters that you are looking for—and which it will pay you to use? Your inquiry, please.

**HARRISON SAFETY BOILER WORKS, Clearfield & 17th Sts., Philadelphia, Pa.**

Manufacturers of Cochrane Feed-Water Heaters, Cochrane Steam & Oil Separators and the Sorge-Cochrane Systems.



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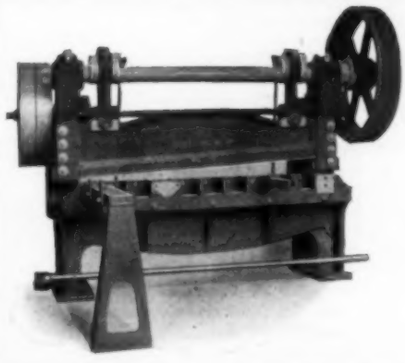

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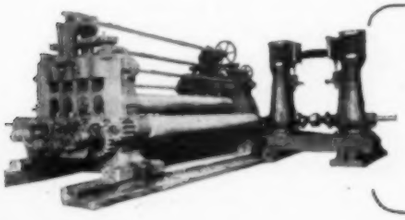

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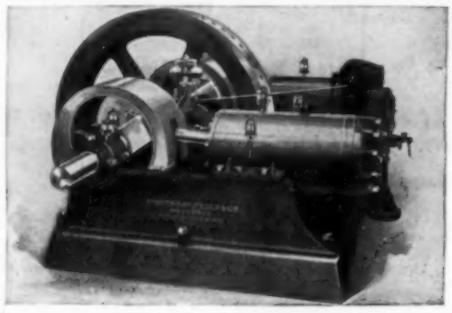

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Arthur Koppel, New York City.
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The Macbeth Iron Co., Cleveland, O.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
New Jersey Fdy. & Mach. Co., New York City.
Russel Wheel & Fdy. Co., Detroit, Mich.
The Wellman-Seaver-Morgan Co., Cleveland, Ohio.

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Watson-Stillman Co., New York City.
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Interstate Engineering Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
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United Engineering & Fdy. Co., Pittsburg, Pa.
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The William E. Gang Co., Cincinnati, O.
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Mechanics Machine Co., Rockford, Ill.
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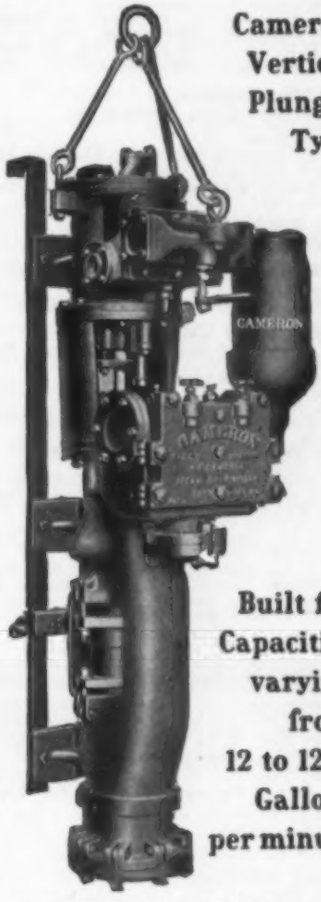

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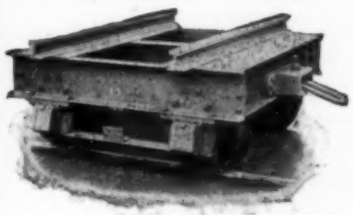

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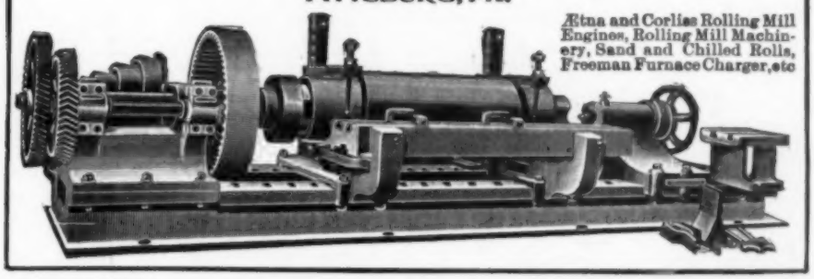

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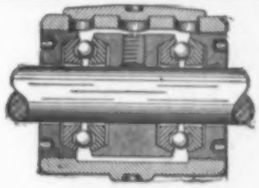

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